

# ANALYTICAL REPORT

June 11, 2019

<sup>1</sup>Cp

<sup>2</sup>Tc

<sup>3</sup>Ss

<sup>4</sup>Cn

<sup>5</sup>Tr

<sup>6</sup>Gl

<sup>7</sup>Al

<sup>8</sup>Sc

## Cardno - Newark, DE

Sample Delivery Group: L1098388

Samples Received: 05/14/2019

Project Number:

Description:

Report To: Art Saunders  
121 Continental Drive Suite 308  
Newark, DE 19713

Entire Report Reviewed By:



Craig Cothron  
Project Manager

Results relate only to the items tested or calibrated and are reported as rounded values. This test report shall not be reproduced, except in full, without written approval of the laboratory. Where applicable, sampling conducted by Pace National is performed per guidance provided in laboratory standard operating procedures: 060302, 060303, and 060304.

# TABLE OF CONTENTS

ONE LAB. NATIONWIDE.



<b>Cp: Cover Page</b>	<b>1</b>	 <sup>1</sup> Cp
<b>Tc: Table of Contents</b>	<b>2</b>	 <sup>2</sup> Tc
<b>Ss: Sample Summary</b>	<b>3</b>	 <sup>3</sup> Ss
<b>Cn: Case Narrative</b>	<b>4</b>	 <sup>4</sup> Cn
<b>Tr: TRRP Summary</b>	<b>5</b>	 <sup>5</sup> Tr
<b>Gl: Glossary of Terms</b>	<b>6</b>	 <sup>6</sup> Gl
<b>Al: Accreditations &amp; Locations</b>	<b>7</b>	 <sup>7</sup> Al
<b>Sc: Sample Chain of Custody</b>	<b>8</b>	 <sup>8</sup> Sc

## SAMPLE SUMMARY

ONE LAB. NATIONWIDE.



WW-20190512-002-DAY 10 L1098388-01 GW      Collected by CP / BF      Collected date/time 05/12/19 11:30      Received date/time 05/14/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Subcontracted Analyses	WG1280861	1	05/31/19 00:00	05/31/19 00:00	CBM	Minneapolis, MN 55414

WW-20190512-002-DAY 10 L1098388-02 GW      Collected by CP / BF      Collected date/time 05/12/19 11:30      Received date/time 05/14/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Subcontracted Analyses	WG1281435	1	05/31/19 00:00	05/31/19 00:00	CBM	Subcontract

<sup>1</sup> Cp<sup>2</sup> Tc<sup>3</sup> Ss<sup>4</sup> Cn<sup>5</sup> Tr<sup>6</sup> Gl<sup>7</sup> Al<sup>8</sup> Sc



All sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times, unless qualified or notated within the report. Where applicable, all MDL (LOD) and RDL (LOQ) values reported for environmental samples have been corrected for the dilution factor used in the analysis. All Method and Batch Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results. By my digital signature below, I affirm to the best of my knowledge, all problems/anomalies observed by the laboratory as having the potential to affect the quality of the data have been identified by the laboratory, and no information or data have been knowingly withheld that would affect the quality of the data.

Craig Cothron  
Project Manager

- <sup>1</sup> Cp
- <sup>2</sup> Tc
- <sup>3</sup> Ss
- <sup>4</sup> Cn
- <sup>5</sup> Tr
- <sup>6</sup> Gl
- <sup>7</sup> Al
- <sup>8</sup> Sc

### Project Narrative

L1098388 -01, -02 contains subout data that is included after the chain of custody.



This data package consists of this signature page, the laboratory review checklist, and the following reportable data as applicable:

R1 - Field chain-of-custody documentation;

R2 - Sample identification cross-reference;

R3 - Test reports (analytical data sheets) for each environmental sample that includes:

- a. Items consistent with NELAC Chapter 5,
- b. dilution factors,
- c. preparation methods,
- d. cleanup methods, and
- e. if required for the project, tentatively identified compounds (TICs).

R4 - Surrogate recovery data including:

- a. Calculated recovery (%R), and
- b. The laboratory's surrogate QC limits.

R5 - Test reports/summary forms for blank samples;

R6 - Test reports/summary forms for laboratory control samples (LCSs) including:

- a. LCS spiking amounts,
- b. Calculated %R for each analyte, and
- c. The laboratory's LCS QC limits.

R7 - Test reports for project matrix spike/matrix spike duplicates (MS/MSDs) including:

- a. Samples associated with the MS/MSD clearly identified,
- b. MS/MSD spiking amounts,
- c. Concentration of each MS/MSD analyte measured in the parent and spiked samples,
- d. Calculated %Rs and relative percent differences (RPDs), and
- e. The laboratory's MS/MSD QC limits

R8 - Laboratory analytical duplicate (if applicable) recovery and precision:

- a. The amount of analyte measured in the duplicate,
- b. The calculated RPD, and
- c. The laboratory's QC limits for analytical duplicates.

R9 - List of method quantitation limits (MQLs) and detectability check sample results for each analyte for each method and matrix.

R10 - Other problems or anomalies.

Release Statement: I am responsible for the release of this laboratory data package. This laboratory is NELAC accredited under the Texas Laboratory Accreditation Program for all the methods, analytes, and matrices reported in this data package except as noted in the Exception Reports. The data have been reviewed and are technically compliant with the requirements of the methods used, except where noted by the laboratory in the Exception Reports. By my signature below, I affirm to the best of my knowledge all problems/anomalies observed by the laboratory have been identified in the Laboratory Review Checklist, and no information affecting the quality of the data has been knowingly withheld.

Craig Cothron  
Project Manager



## Guide to Reading and Understanding Your Laboratory Report

The information below is designed to better explain the various terms used in your report of analytical results from the Laboratory. This is not intended as a comprehensive explanation, and if you have additional questions please contact your project representative.

### Abbreviations and Definitions

SDG	Sample Delivery Group.
Uncertainty (Radiochemistry)	Confidence level of 2 sigma.
Case Narrative (Cn)	A brief discussion about the included sample results, including a discussion of any non-conformances to protocol observed either at sample receipt by the laboratory from the field or during the analytical process. If present, there will be a section in the Case Narrative to discuss the meaning of any data qualifiers used in the report.
Quality Control Summary (Qc)	This section of the report includes the results of the laboratory quality control analyses required by procedure or analytical methods to assist in evaluating the validity of the results reported for your samples. These analyses are not being performed on your samples typically, but on laboratory generated material.
Sample Chain of Custody (Sc)	This is the document created in the field when your samples were initially collected. This is used to verify the time and date of collection, the person collecting the samples, and the analyses that the laboratory is requested to perform. This chain of custody also documents all persons (excluding commercial shippers) that have had control or possession of the samples from the time of collection until delivery to the laboratory for analysis.
Sample Results (Sr)	This section of your report will provide the results of all testing performed on your samples. These results are provided by sample ID and are separated by the analyses performed on each sample. The header line of each analysis section for each sample will provide the name and method number for the analysis reported.
Sample Summary (Ss)	This section of the Analytical Report defines the specific analyses performed for each sample ID, including the dates and times of preparation and/or analysis.

Qualifier	Description
	The remainder of this page intentionally left blank, there are no qualifiers applied to this SDG.

<sup>1</sup>Cp<sup>2</sup>Tc<sup>3</sup>Ss<sup>4</sup>Cn<sup>5</sup>Tr<sup>6</sup>Gl<sup>7</sup>Al<sup>8</sup>Sc



Pace National is the only environmental laboratory accredited/certified to support your work nationwide from one location. One phone call, one point of contact, one laboratory. No other lab is as accessible or prepared to handle your needs throughout the country. Our capacity and capability from our single location laboratory is comparable to the collective totals of the network laboratories in our industry. The most significant benefit to our one location design is the design of our laboratory campus. The model is conducive to accelerated productivity, decreasing turn-around time, and preventing cross contamination, thus protecting sample integrity. Our focus on premium quality and prompt service allows us to be YOUR LAB OF CHOICE.

- \* Not all certifications held by the laboratory are applicable to the results reported in the attached report.
- \* Accreditation is only applicable to the test methods specified on each scope of accreditation held by Pace National.

## State Accreditations

Alabama	40660
Alaska	17-026
Arizona	AZ0612
Arkansas	88-0469
California	2932
Colorado	TN00003
Connecticut	PH-0197
Florida	E87487
Georgia	NELAP
Georgia <sup>1</sup>	923
Idaho	TN00003
Illinois	200008
Indiana	C-TN-01
Iowa	364
Kansas	E-10277
Kentucky <sup>1,6</sup>	90010
Kentucky <sup>2</sup>	16
Louisiana	AI30792
Louisiana <sup>1</sup>	LA180010
Maine	TN0002
Maryland	324
Massachusetts	M-TN003
Michigan	9958
Minnesota	047-999-395
Mississippi	TN00003
Missouri	340
Montana	CERT0086

Nebraska	NE-OS-15-05
Nevada	TN-03-2002-34
New Hampshire	2975
New Jersey-NELAP	TN002
New Mexico <sup>1</sup>	n/a
New York	11742
North Carolina	Env375
North Carolina <sup>1</sup>	DW21704
North Carolina <sup>3</sup>	41
North Dakota	R-140
Ohio-VAP	CL0069
Oklahoma	9915
Oregon	TN200002
Pennsylvania	68-02979
Rhode Island	LA000356
South Carolina	84004
South Dakota	n/a
Tennessee <sup>1,4</sup>	2006
Texas	T104704245-18-15
Texas <sup>5</sup>	LAB0152
Utah	TN00003
Vermont	VT2006
Virginia	460132
Washington	C847
West Virginia	233
Wisconsin	9980939910
Wyoming	A2LA

## Third Party Federal Accreditations

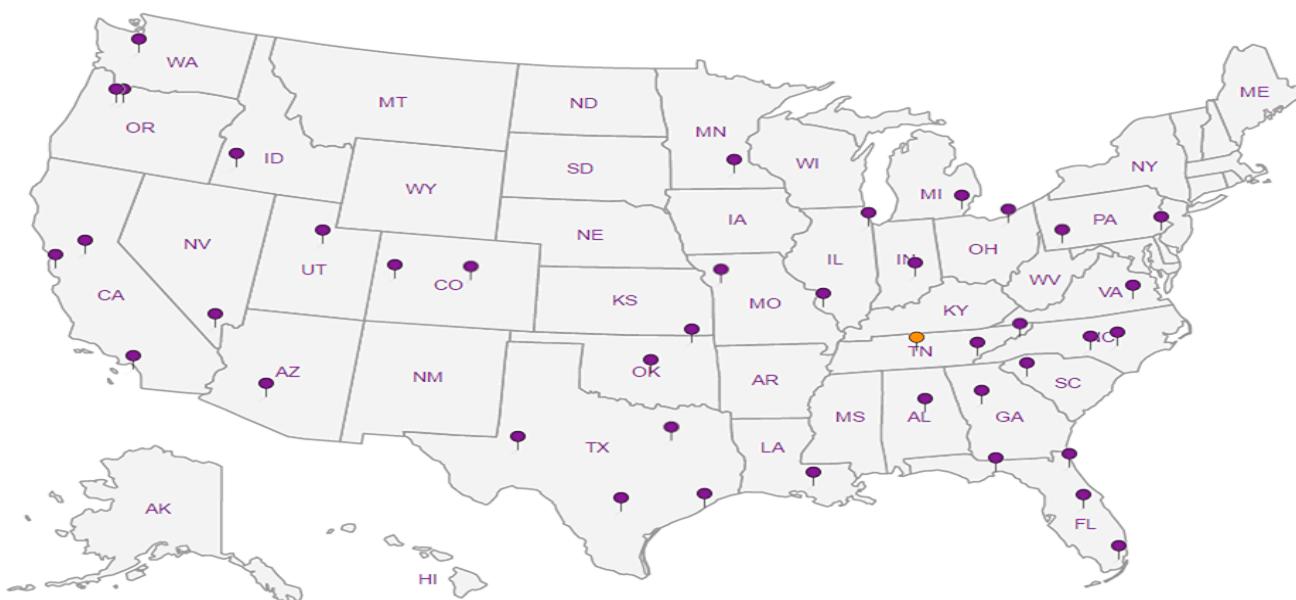
A2LA – ISO 17025	1461.01
A2LA – ISO 17025 <sup>5</sup>	1461.02
Canada	1461.01
EPA-Crypto	TN00003

AIHA-LAP,LLC EMLAP	100789
DOD	1461.01
USDA	P330-15-00234

<sup>1</sup> Drinking Water <sup>2</sup> Underground Storage Tanks <sup>3</sup> Aquatic Toxicity <sup>4</sup> Chemical/Microbiological <sup>5</sup> Mold <sup>6</sup> Wastewater n/a Accreditation not applicable

## Our Locations

Pace National has sixty-four client support centers that provide sample pickup and/or the delivery of sampling supplies. If you would like assistance from one of our support offices, please contact our main office. Pace National performs all testing at our central laboratory.



- <sup>1</sup> Cp
- <sup>2</sup> Tc
- <sup>3</sup> Ss
- <sup>4</sup> Cn
- <sup>5</sup> Tr
- <sup>6</sup> Gl
- <sup>7</sup> Al
- <sup>8</sup> Sc

Cardno - Newark, DE 121 Continental Dr. Suite 308 Newark, DE 19713		Billing Information: <b>Accounts Payable</b> 121 Continental Dr. Suite 308 Newark, DE 19713		Pres Chk	Analysis / Container / Preservative						Chain of Custody			
Report to: <b>Art Saunders</b>		Email To: <b>Art.Saunders@cardno.com</b>											Page ____ of ____	
Project Description:		City/State Collected:												
Phone: <b>610-220-3957</b>	Client Project #		Lab Project # <b>CARDNO-NDE-ITC</b>									12065 Lebanon Rd Mount Juliet, TN 37122 Phone: 615-758-5858 Phone: 800-767-5859 Fax: 615-758-5859		
Collected by (print): <b>C. Pina, R. Frizzell</b>	Site/Facility ID #		P.O. #									L# <b>109 732</b>		
Collected by (signature): <b>C. Pina</b>	Rush? (Lab MUST Be Notified)		Quote #									Table # <b>B137</b>		
Immediately Packed on Ice N <input checked="" type="checkbox"/> Y <input type="checkbox"/>	Same Day <input type="checkbox"/> Next Day <input type="checkbox"/> Two Day <input type="checkbox"/> Three Day <input type="checkbox"/>		Five Day 5 Day (Rad Only) 10 Day (Rad Only)		Date Results Needed	No. of Cntrs						Acctnum:		
Sample ID	Comp/Grab	Matrix *	Depth	Date	Time							Template:		
NW-20190512-002-day10 Comp WW				5/12/19	1130	14	X	X	X	X	X	Preligin:		
NW-20190512-002-day10 Grab WW				5/12/19	1130	2	X				X	TSR:		
												PB:		
												Shipped Via:		
												Remarks   Sample # (lab only)		
* Matrix: SS - Soil AIR - Air F - Filter GW - Groundwater B - Bioassay WW - WasteWater DW - Drinking Water OT - Other _____	Remarks:						pH _____	Temp _____	Sample Receipt Checklist					
							Flow _____	Other _____	COC Seal Present/Intact: <input checked="" type="checkbox"/> NP <input type="checkbox"/> Y <input type="checkbox"/> N					
									COC Signed/Accurate: <input checked="" type="checkbox"/>					
									Bottles arrive intact: <input checked="" type="checkbox"/>					
									Correct bottles used: <input checked="" type="checkbox"/>					
									Sufficient volume sent: <input checked="" type="checkbox"/>					
									If Applicable <input type="checkbox"/>					
									VOA Zero Headspace: <input checked="" type="checkbox"/>					
									Preservation Correct/Checked: <input checked="" type="checkbox"/>					
									RAD SCREEN: <0.5 mR/hr					
Relinquished by : (Signature)	Date: <b>5/13/19</b>	Time: <b>14:55</b>	Received by: (Signature)		Trip Blank Received: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> HCl / MeOH TBR		If preservation required by Lab: Date/Time							
Relinquished by : (Signature)	Date: <b>5/13/19</b>	Time: <b>19:00</b>	Received by: (Signature)		Temp: <b>A38F°C</b> Bottles Received: <b>2.9±0.2.9</b> 36									
Relinquished by : (Signature)	Date: _____	Time: _____	Received for lab by: (Signature)		Date: <b>5/14/19</b>	Time: <b>0845</b>	Hold: _____		Condition: <b>NCF</b> <input checked="" type="checkbox"/>					

**Report Prepared for:**

Benita Miller  
Pace Analytical National  
12065 Lebanon Road  
Mount Juliet TN 37122

**REPORT OF  
LABORATORY  
ANALYSIS FOR  
PCDD/PCDF**

**Report Prepared Date:**  
May 30, 2019

**Report Information:**

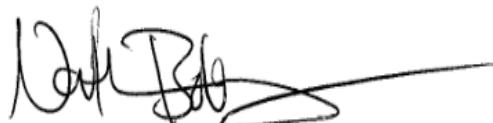
**Pace Project #:** 10475018  
**Sample Receipt Date:** 05/15/2019  
**Client Project #:** L1098388: WG1280861  
**Client Sub PO #:** L1098388  
**State Cert #:** N/A

**Invoicing & Reporting Options:**

The report provided has been invoiced as a Level 3 PCDD/PCDF Report. If an upgrade of this report package is requested, an additional charge may be applied.

Please review the attached invoice for accuracy and forward any questions to Nathan Boberg, your Pace Project Manager.

**This report has been reviewed by:**



May 30, 2019

Nathan Boberg, Project Manager  
612-360-0728  
(612) 607-6444 (fax)  
nathan.boberg@pacelabs.com



**Report of Laboratory Analysis**

This report should not be reproduced, except in full, without the written consent of Pace Analytical Services, Inc.

The results relate only to the samples included in this report.



Pace Analytical Services, LLC.  
1700 Elm Street  
Minneapolis, MN 55414  
Phone: 612.607.1700  
Fax: 612.607.6444

## **DISCUSSION**

This report presents the results from the analysis performed on one sample submitted by a representative of Pace Analytical National. The sample was analyzed for the presence or absence of polychlorodibenzo-p-dioxins (PCDDs) and polychlorodibenzofurans (PCDFs) using USEPA Method 1613B. The reporting limits were based on signal-to-noise measurements. Estimated Maximum Possible Concentration (EMPC) values were treated as positives in the toxic equivalence calculations.

The recoveries of the isotopically-labeled PCDD/PCDF internal standards in the sample extract ranged from 64-86%. All of the labeled standard recoveries obtained for this project were within the target ranges specified in Method 1613B. Also, since the quantification of the native 2,3,7,8-substituted congeners was based on isotope dilution, the data were automatically corrected for recovery and accurate values were obtained.

Values were flagged "I" where incorrect isotope ratios were obtained. Concentrations below the calibration range were flagged "J" and should be regarded as estimates.

A laboratory method blank was prepared and analyzed with the sample batch as part of our routine quality control procedures. The results show the blank to contain a trace level of OCDD. This level was below the calibration range of the method. Also, OCDD was not detected in the field sample.

Laboratory spike samples were also prepared with the sample batch using clean reference matrix that had been fortified with native standard materials. The results show that the spiked native compounds were recovered at 95-121% with relative percent differences of 0.0-10.5%. These results were within the target ranges for the method. Matrix spikes were not prepared with the sample batch.

## **REPORT OF LABORATORY ANALYSIS**

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Pace Analytical Services, LLC  
1700 Elm Street - Suite 200  
Minneapolis, MN 55414

Tel: 612-607-1700  
Fax: 612-607-6444

## Minnesota Laboratory Certifications

Authority	Certificate #	Authority	Certificate #
A2LA	2926.01	Minnesota - Pet	1240
Alabama	40770	Mississippi	MN00064
Alaska - DW	MN00064	Missouri - DW	10100
Alaska - UST	17-009	Montana	CERT0092
Arizona	AZ0014	Nebraska	NE-OS-18-06
Arkansas - DW	MN00064	Nevada	MN00064
Arkansas - WW	88-0680	New Hampshire	2081
CNMI Saipan	MP0003	New Jersey (NE	MN002
California	2929	New York	11647
Colorado	MN00064	North Carolina	27700
Connecticut	PH-0256	North Carolina -	27700
EPA Region 8+	via MN 027-053	North Carolina -	530
Florida (NELAP	E87605	North Dakota	R-036
Georgia	959	Ohio - DW	41244
Guam	17-001r	Ohio - VAP	CL101
Hawaii	MN00064	Oklahoma	9507
Idaho	MN00064	Oregon - Primar	MN300001
Illinois	200011	Oregon - Secon	MN200001
Indiana	C-MN-01	Pennsylvania	68-00563
Iowa	368	Puerto Rico	MN00064
Kansas	E-10167	South Carolina	74003
Kentucky - DW	90062	South Dakota	NA
Kentucky - WW	90062	Tennessee	TN02818
Louisiana - DE	03086	Texas	T104704192
Louisiana - DW	MN00064	Utah (NELAP)	MN00064
Maine	MN00064	Virginia	460163
Maryland	322	Washington	C486
Massachusetts	M-MN064	West Virginia -	382
Michigan	9909	West Virginia -	9952C
Minnesota	027-053-137	Wisconsin	999407970
Minnesota - De	via MN 027-053	Wyoming - UST	2926.01

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
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Report No.....10475018

## Reporting Flags

- A = Reporting Limit based on signal to noise
- B = Less than 10x higher than method blank level
- C = Result obtained from confirmation analysis
- D = Result obtained from analysis of diluted sample
- E = Exceeds calibration range
- I = Interference present
- J = Estimated value
- L = Suppressive interference, analyte may be biased low
- Nn = Value obtained from additional analysis
- P = PCDEInterference
- R = Recovery outside target range
- S = Peak saturated
- U = Analyte not detected
- V = Result verified by confirmation analysis
- X = %D Exceeds limits
- Y = Calculated using average of daily RFs
- \* = SeeDiscussion

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
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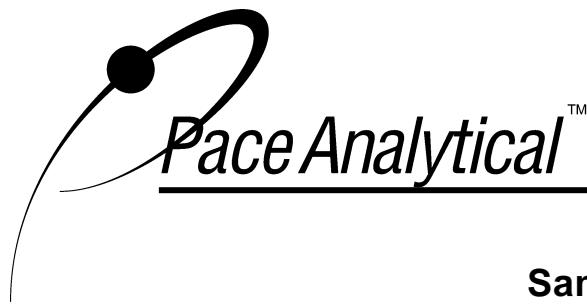
Report No.....10475018

Report No.....10475018\_1613FC\_DFR

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## **Appendix A**

### **Sample Management**



Pace Analytical Services, Inc.  
1700 Elm Street - Suite 200  
Minneapolis, MN 55414

Tel: 612-607-1700  
Fax: 612-607-6444

## Sample ID Cross Reference

**Client Sample ID**

WW-20190512-002-DAY 10

**Pace Sample ID**

10475018001

**Date Received**

05/15/2019

**Sample Type**

Water

## REPORT OF LABORATORY ANALYSIS

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# CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

Report No.... 10475018\_1613FC\_DFR

## Section A

### Required Client Information:

Company: Pace Analytical National  
Address: 12065 Lebanon Road  
Mount Juliet, TN 37122  
Email: SuboutTeam@pacenational.com  
Phone: (615)773-9756 Fax (615)758-5859  
Requested Due Date: 29-May

## Section B

### Required Project Information:

Report To: Pace Analytical National Subout Team  
Copy To:  
Purchase Order #: L1098388  
Project Name: na  
Project #: na

## Section C

### Invoice Information:

Attention: Art Saunders  
Company Name:  
Address:  
Pace Quote:  
Pace Project Manager: Nathan Boberg  
Pace Profile #: 38076

Page : 1 Of 1

Regulatory Agency

State/Location

DE

ITEM #	SAMPLE ID <small>One Character per box. (A-Z, 0-9 /, -) Sample IDs must be unique</small>	MATRIX Drinking Water Water Waste Water Product Soil/Solid Oil Wipe Air Other Tissue	CODE DW WT WW P SL OL WP AR OT TS	MATRIX CODE (see valid codes to left) <small>G=GRAB C=COMP</small>	COLLECTED				SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives				ANALYSES TEST	Requested Analysis Filtered (Y/N)				Residual Chlorine (Y/N)
					START		END				H2SO4	HNO3	HCl	NaOH		Na2S2O3	Methanol	Other	QC3: Dioxins/FURANS met	
1	WW-20190512-002-DAY 10	WT			12-May	11:30		2	2	Unpreserved	H2SO4	HNO3	HCl	NaOH	Na2S2O3	Methanol	Other	X	CO1	
2																				
3																				
4																				
5																				
6																				
7																				
8																				
9																				
10																				
11																				
12																				
ADDITIONAL COMMENTS				RELINQUISHED BY / AFFILIATION				DATE	TIME	ACCEPTED BY / AFFILIATION				DATE	TIME	SAMPLE CONDITIONS				
Pace Analytical National Batch: WG1280861				Gabi Flensburg <i>Steve Stilley</i>				14-May	15:08	<i>John</i> <i>CETCO Pace</i>				5-14-19	8:45					
Pace Analytical National SDGs: L1098388														5/15/19	8:45	0-4	Y	Y	Y	
Location: Minneapolis, MN 55414																				
SAMPLER NAME AND SIGNATURE																				
PRINT Name of SAMPLER:																				
SIGNATURE of SAMPLER:												DATE Signed:								
TEMP in C	Received on Ice (Y/N)	Custody Sealed (Y/N)	Cooler Samples (Y/N)	Intact Samples (Y/N)																

WO# : 10475018





Document Name:  
**Sample Condition Upon Receipt Form**

Document Revised: 09May2019

Page 1 of 1

Document No.:  
**F-MN-L-213-rev.28**

Issuing Authority:  
Pace Minnesota Quality Office

**Sample Condition  
Upon Receipt**

Client Name:

*Pace National*

Project #:

**WO# : 10475018**

PM: NB3

Due Date: 05/30/19

CLIENT: ESC\_TN

Courier:

Fed Ex     UPS     USPS     Client  
 Pace     SpeeDee     Commercial See Exception

Tracking Number: 1023 1351 5250

Custody Seal on Cooler/Box Present?

Seals Intact? Biological Tissue Frozen?  Yes  No  N/A

Packing Material:

 Bubble Wrap Bubble Bags None Other \_\_\_\_\_Temp Blank?  Yes  NoThermometer:  T1(0461)  T2(1336)  T3(0459)  
 T4(0254)  T5(0489)Type of Ice:  Wet Blue None Dry Melted

Note: Each West Virginia Sample must have temp taken (no temp blanks)

Temp should be above freezing to 6°C

Cooler Temp Read w/temp blank: 0-2

°C

Average Corrected Temp See Exceptions

Correction Factor: +0.1Cooler Temp Corrected w/temp blank: 0-4

°C

(no temp blank only):

USDA Regulated Soil: ( N/A, water sample/Other: \_\_\_\_\_)Date/Initials of Person Examining Contents: GIVL 5/15/19Did samples originate in a quarantine zone within the United States: AL, AR, CA, FL, GA, ID, LA, MS, NC, NM, NY, OK, OR, SC, TN, TX or VA (check maps)?  Yes  NoDid samples originate from a foreign source (internationally, including Hawaii and Puerto Rico)?  Yes  No

If Yes to either question, fill out a Regulated Soil Checklist (F-MN-Q-338) and include with SCUR/COC paperwork.

			COMMENTS:	
Chain of Custody Present and Filled Out?	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	1.	
Chain of Custody Relinquished?	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	2.	
Sampler Name and/or Signature on COC?	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input checked="" type="checkbox"/> N/A	
Samples Arrived within Hold Time?	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	3.	
Short Hold Time Analysis (<72 hr)?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	4.	
Rush Turn Around Time Requested?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	5.	
Sufficient Volume?	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	6.	
Correct Containers Used? -Pace Containers Used?	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	7.	
Containers Intact?	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	8.	
Field Filtered Volume Received for Dissolved Tests?	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input checked="" type="checkbox"/> N/A	
Is sufficient information available to reconcile the samples to the COC?	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	10. Is sediment visible in the dissolved container? <input type="checkbox"/> Yes <input type="checkbox"/> No	
Matrix: <input checked="" type="checkbox"/> Water <input type="checkbox"/> Soil <input type="checkbox"/> Oil <input type="checkbox"/> Other	11. If no, write ID/ Date/Time on Container Below: See Exception <input type="checkbox"/>			
All containers needing acid/base preservation have been checked?	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input checked="" type="checkbox"/> N/A	12. Sample #
All containers needing preservation are found to be in compliance with EPA recommendation? (HNO <sub>3</sub> , H <sub>2</sub> SO <sub>4</sub> , <2pH, NaOH>9 Sulfide, NaOH>12 Cyanide)	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input checked="" type="checkbox"/> N/A	<input type="checkbox"/> NaOH <input type="checkbox"/> HNO <sub>3</sub> <input type="checkbox"/> H <sub>2</sub> SO <sub>4</sub> <input type="checkbox"/> Zinc Acetate
Exceptions: VOA, Coliform, TOC/DOC Oil and Grease, DRO/8015 (water) and Dioxin/PFAS	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input checked="" type="checkbox"/> N/A	Positive for Res. <input type="checkbox"/> Yes Chlorine? <input type="checkbox"/> No    pH Paper Lot# Res. Chlorine    0-6 Roll    0-6 Strip    0-14 Strip
Headspace in VOA Vials (greater than 6mm)?	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input checked="" type="checkbox"/> N/A	13. See Exception <input type="checkbox"/>
Trip Blank Present?	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input checked="" type="checkbox"/> N/A	14. Pace Trip Blank Lot # (if purchased):
Comments/Resolution:				Field Data Required? <input type="checkbox"/> Yes <input type="checkbox"/> No

## CLIENT NOTIFICATION/RESOLUTION

Person Contacted: \_\_\_\_\_

Date/Time: \_\_\_\_\_

Comments/Resolution: \_\_\_\_\_

Field Data Required?  Yes  NoProject Manager Review: J. H. Barber

Date: 5/20/19

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e. out of hold, incorrect preservative, out of temp, incorrect containers).

Labeled by: \_\_\_\_\_

## **Appendix B**

### **Sample Analysis Summary**



Pace Analytical Services, LLC  
1700 Elm Street - Suite 200  
Minneapolis, MN 55414

Tel: 612-607-1700  
Fax: 612-607-6444

## Method 1613B Sample Analysis Results

Client - Pace Analytical National

Client's Sample ID	WW-20190512-002-DAY 10		
Lab Sample ID	10475018001		
Filename	F190529C_02		
Injected By	ZMS		
Total Amount Extracted	991 mL	Matrix	Water
% Moisture	NA	Dilution	NA
Dry Weight Extracted	NA	Collected	05/12/2019 11:30
ICAL ID	F190508	Received	05/15/2019 08:45
CCal Filename(s)	F190529B_14	Extracted	05/23/2019 09:10
Method Blank ID	BLANK-70738	Analyzed	05/29/2019 20:52

Native Isomers	Conc pg/L	EMPC pg/L	EDL pg/L	Internal Standards	ng's Added	Percent Recovery
2,3,7,8-TCDF	ND	---	1.6	2,3,7,8-TCDF-13C	2.00	82
Total TCDF	ND	---	1.6	2,3,7,8-TCDD-13C	2.00	82
				1,2,3,7,8-PeCDF-13C	2.00	82
2,3,7,8-TCDD	ND	---	2.9	2,3,4,7,8-PeCDF-13C	2.00	82
Total TCDD	ND	---	2.9	1,2,3,7,8-PeCDD-13C	2.00	86
				1,2,3,4,7,8-HxCDF-13C	2.00	76
1,2,3,7,8-PeCDF	ND	---	2.5	1,2,3,6,7,8-HxCDF-13C	2.00	78
2,3,4,7,8-PeCDF	ND	---	3.7	2,3,4,6,7,8-HxCDF-13C	2.00	84
Total PeCDF	ND	---	3.1	1,2,3,7,8,9-HxCDF-13C	2.00	83
				1,2,3,4,7,8-HxCDD-13C	2.00	74
1,2,3,7,8-PeCDD	ND	---	3.6	1,2,3,6,7,8-HxCDD-13C	2.00	70
Total PeCDD	ND	---	3.6	1,2,3,4,6,7,8-HpCDF-13C	2.00	70
				1,2,3,4,7,8,9-HpCDF-13C	2.00	71
1,2,3,4,7,8-HxCDF	ND	---	1.6	1,2,3,4,6,7,8-HpCDD-13C	2.00	79
1,2,3,6,7,8-HxCDF	ND	---	1.8	OCDD-13C	4.00	64
2,3,4,6,7,8-HxCDF	ND	---	1.2			
1,2,3,7,8,9-HxCDF	ND	---	2.1	1,2,3,4-TCDD-13C	2.00	NA
Total HxCDF	ND	---	1.7	1,2,3,7,8,9-HxCDD-13C	2.00	NA
1,2,3,4,7,8-HxCDD	ND	---	1.7	2,3,7,8-TCDD-37Cl4	0.20	96
1,2,3,6,7,8-HxCDD	ND	---	1.5			
1,2,3,7,8,9-HxCDD	ND	---	2.1			
Total HxCDD	ND	---	1.7			
1,2,3,4,6,7,8-HpCDF	ND	---	2.0	Total 2,3,7,8-TCDD		
1,2,3,4,7,8,9-HpCDF	ND	---	2.3	Equivalence: 0.0012 pg/L		
Total HpCDF	ND	---	2.1	(Lower-bound - Using 2005 WHO Factors)		
1,2,3,4,6,7,8-HpCDD	ND	---	1.7			
Total HpCDD	ND	---	1.7			
OCDF	ND	---	1.9			
OCDD	---	4.0	2.4 IJ			

Conc = Concentration (Totals include 2,3,7,8-substituted isomers).

EMPC = Estimated Maximum Possible Concentration

EDL = Estimated Detection Limit

ND = Not Detected

NA = Not Applicable

NC = Not Calculated

J = Estimated value

I = Interference present

## REPORT OF LABORATORY ANALYSIS

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## 2,3,7,8-TCDD Toxic Equivalency (TEQ) Calculations

Pace Analytical National

Client's Sample ID	WW-20190512-002-DAY 10		
Lab Sample ID	10475018001		
Filename	F190529C_02		
Injected By	ZMS		
Total Amount Extracted	991 mL	Matrix	Water
% Moisture	NA	Dilution	NA
Dry Weight Extracted	NA	Collected	05/12/2019 11:30
ICAL ID	F190508	Received	05/15/2019 08:45
CCal Filename(s)	F190529B_14	Extracted	05/23/2019 09:10
Method Blank ID	BLANK-70738	Analyzed	05/29/2019 20:52

Parameter	Conc pg/L	RL pg/L	WHO2005	LB	MB	UB
2,3,7,8-TCDF	ND	1.6	0.10000	0.0000	0.0806	0.1613
Total TCDF	ND	1.6	0.00000	0.0000	0.0000	0.0000
2,3,7,8-TCDD	ND	2.9	1.00000	0.0000	1.4374	2.8747
Total TCDD	ND	2.9	0.00000	0.0000	0.0000	0.0000
1,2,3,7,8-PeCDF	ND	2.5	0.03000	0.0000	0.0378	0.0756
2,3,4,7,8-PeCDF	ND	3.7	0.30000	0.0000	0.5483	1.0966
Total PeCDF	ND	3.1	0.00000	0.0000	0.0000	0.0000
1,2,3,7,8-PeCDD	ND	3.6	1.00000	0.0000	1.8122	3.6243
Total PeCDD	ND	3.6	0.00000	0.0000	0.0000	0.0000
1,2,3,4,7,8-HxCDF	ND	1.6	0.10000	0.0000	0.0822	0.1643
1,2,3,6,7,8-HxCDF	ND	1.8	0.10000	0.0000	0.0920	0.1840
2,3,4,6,7,8-HxCDF	ND	1.2	0.10000	0.0000	0.0587	0.1174
1,2,3,7,8,9-HxCDF	ND	2.1	0.10000	0.0000	0.1063	0.2127
Total HxCDF	ND	1.7	0.00000	0.0000	0.0000	0.0000
1,2,3,4,7,8-HxCDD	ND	1.7	0.10000	0.0000	0.0834	0.1668
1,2,3,6,7,8-HxCDD	ND	1.5	0.10000	0.0000	0.0740	0.1480
1,2,3,7,8,9-HxCDD	ND	2.1	0.10000	0.0000	0.1027	0.2053
Total HxCDD	ND	1.7	0.00000	0.0000	0.0000	0.0000
1,2,3,4,6,7,8-HpCDF	ND	2.0	0.01000	0.0000	0.0098	0.0197
1,2,3,4,7,8,9-HpCDF	ND	2.3	0.01000	0.0000	0.0113	0.0226
Total HpCDF	ND	2.1	0.00000	0.0000	0.0000	0.0000
1,2,3,4,6,7,8-HpCDD	ND	1.7	0.01000	0.0000	0.0086	0.0172
Total HpCDD	ND	1.7	0.00000	0.0000	0.0000	0.0000
OCDF	ND	1.9	0.00030	0.0000	0.0003	0.0006
OCDD	ND	2.4	0.00030	0.0012	0.0012	0.0012

0.0012 pg/L      4.5 pg/L      9.1 pg/L

Final values are valid to only 2 significant figures

TEQs for Totals classes include contributions from non 2,3,7,8 isomers only

LB = Lower Bound, Where "ND", TEQ Conc = 0

MB = Medium Bound, Where "ND", TEQ Conc = (LOD/2) \* (TEF Factor)

UB = Upper Bound, Where "ND", TEQ Conc = LOD \* (TEF Factor)

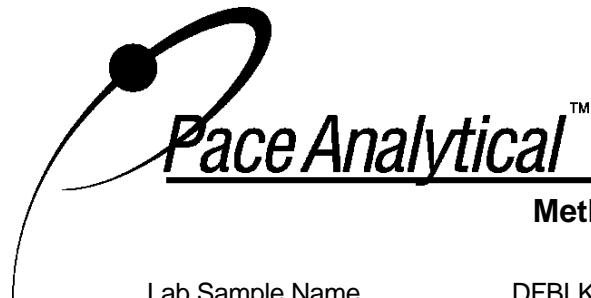
RL = Reporting Limit

## REPORT OF LABORATORY ANALYSIS

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## **Appendix C**

### **QC and Calibration Results Summary**



## Method 1613B Blank Analysis Results

Lab Sample Name	DFBLKYI	Matrix	
Lab Sample ID	BLANK-70738	Dilution	Water
Filename	Y190529A_05	Extracted	NA
Total Amount Extracted	1000 mL	Analyzed	05/23/2019 09:10
ICAL ID	Y190424	Injected By	05/29/2019 12:39
CCal Filename(s)	Y190529A_01	ZMS	

Native Isomers	Conc pg/L	EMPC pg/L	EDL pg/L	Internal Standards	ng's Added	Percent Recovery
2,3,7,8-TCDF	ND	---	1.5	2,3,7,8-TCDF-13C	2.00	76
Total TCDF	ND	---	1.5	2,3,7,8-TCDD-13C	2.00	72
				1,2,3,7,8-PeCDF-13C	2.00	83
2,3,7,8-TCDD	ND	---	2.2	2,3,4,7,8-PeCDF-13C	2.00	85
Total TCDD	ND	---	2.2	1,2,3,7,8-PeCDD-13C	2.00	86
				1,2,3,4,7,8-HxCDF-13C	2.00	85
1,2,3,7,8-PeCDF	ND	---	2.0	1,2,3,6,7,8-HxCDF-13C	2.00	89
2,3,4,7,8-PeCDF	ND	---	1.7	2,3,4,6,7,8-HxCDF-13C	2.00	89
Total PeCDF	ND	---	1.9	1,2,3,7,8,9-HxCDF-13C	2.00	89
				1,2,3,4,7,8-HxCDD-13C	2.00	77
1,2,3,7,8-PeCDD	ND	---	2.8	1,2,3,6,7,8-HxCDD-13C	2.00	70
Total PeCDD	ND	---	2.8	1,2,3,4,6,7,8-HpCDF-13C	2.00	79
				1,2,3,4,7,8-HpCDF-13C	2.00	82
1,2,3,4,7,8-HxCDF	ND	---	4.0	1,2,3,4,6,7,8-HpCDD-13C	2.00	83
1,2,3,6,7,8-HxCDF	ND	---	3.5	OCDD-13C	4.00	87
2,3,4,6,7,8-HxCDF	ND	---	3.6			
1,2,3,7,8,9-HxCDF	ND	---	3.1	1,2,3,4-TCDD-13C	2.00	NA
Total HxCDF	ND	---	3.5	1,2,3,7,8,9-HxCDD-13C	2.00	NA
1,2,3,4,7,8-HxCDD	ND	---	7.3	2,3,7,8-TCDD-37Cl4	0.20	85
1,2,3,6,7,8-HxCDD	ND	---	6.9			
1,2,3,7,8,9-HxCDD	ND	---	7.8			
Total HxCDD	ND	---	7.3			
1,2,3,4,6,7,8-HpCDF	ND	---	1.9	Total 2,3,7,8-TCDD		
1,2,3,4,7,8,9-HpCDF	ND	---	2.0	Equivalence: 0.0022 pg/L		
Total HpCDF	ND	---	2.0	(Lower-bound - Using 2005 WHO Factors)		
1,2,3,4,6,7,8-HpCDD	ND	---	2.6			
Total HpCDD	ND	---	2.6			
OCDF	----	2.8	2.5 IJ			
OCDD	4.5	----	4.2 J			

Conc = Concentration (Totals include 2,3,7,8-substituted isomers).

EMPC = Estimated Maximum Possible Concentration

EDL = Estimated Detection Limit

J = Estimated value

I = Interference present

## REPORT OF LABORATORY ANALYSIS

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## 2,3,7,8-TCDD Toxic Equivalency (TEQ) Calculations

Pace Analytical National

Client's Sample ID	DFBLKYI					
Lab Sample ID	BLANK-70738					
Filename	Y190529A_05					
Injected By	ZMS					
Total Amount Extracted	1000 mL		Matrix	Water		
% Moisture	NA	Dilution		NA		
Dry Weight Extracted	NA	Collected		05/22/2019 13:58		
ICAL ID	Y190424	Received		05/22/2019 13:58		
CCal Filename(s)	Y190529A_01	Extracted		05/23/2019 09:10		
Method Blank ID		Analyzed		05/29/2019 12:39		

Parameter	Conc pg/L	RL pg/L	WHO2005	LB	MB	UB
2,3,7,8-TCDF	ND	1.5	0.10000	0.0000	0.0762	0.1524
Total TCDF	ND	1.5	0.00000	0.0000	0.0000	0.0000
2,3,7,8-TCDD	ND	2.2	1.00000	0.0000	1.1177	2.2354
Total TCDD	ND	2.2	0.00000	0.0000	0.0000	0.0000
1,2,3,7,8-PeCDF	ND	2.0	0.03000	0.0000	0.0305	0.0610
2,3,4,7,8-PeCDF	ND	1.7	0.30000	0.0000	0.2542	0.5084
Total PeCDF	ND	1.9	0.00000	0.0000	0.0000	0.0000
1,2,3,7,8-PeCDD	ND	2.8	1.00000	0.0000	1.3912	2.7824
Total PeCDD	ND	2.8	0.00000	0.0000	0.0000	0.0000
1,2,3,4,7,8-HxCDF	ND	4.0	0.10000	0.0000	0.2006	0.4012
1,2,3,6,7,8-HxCDF	ND	3.5	0.10000	0.0000	0.1738	0.3477
2,3,4,6,7,8-HxCDF	ND	3.6	0.10000	0.0000	0.1804	0.3607
1,2,3,7,8,9-HxCDF	ND	3.1	0.10000	0.0000	0.1538	0.3076
Total HxCDF	ND	3.5	0.00000	0.0000	0.0000	0.0000
1,2,3,4,7,8-HxCDD	ND	7.3	0.10000	0.0000	0.3664	0.7328
1,2,3,6,7,8-HxCDD	ND	6.9	0.10000	0.0000	0.3430	0.6859
1,2,3,7,8,9-HxCDD	ND	7.8	0.10000	0.0000	0.3910	0.7820
Total HxCDD	ND	7.3	0.00000	0.0000	0.0000	0.0000
1,2,3,4,6,7,8-HpCDF	ND	1.9	0.01000	0.0000	0.0097	0.0194
1,2,3,4,7,8,9-HpCDF	ND	2.0	0.01000	0.0000	0.0101	0.0202
Total HpCDF	ND	2.0	0.00000	0.0000	0.0000	0.0000
1,2,3,4,6,7,8-HpCDD	ND	2.6	0.01000	0.0000	0.0131	0.0262
Total HpCDD	ND	2.6	0.00000	0.0000	0.0000	0.0000
OCDF	ND	2.5	0.00030	0.0008	0.0008	0.0008
OCDD	4.5	4.2	0.00030	0.0014	0.0014	0.0014

0.0022 pg/L      4.7 pg/L      9.4 pg/L

Final values are valid to only 2 significant figures

TEQs for Totals classes include contributions from non 2,3,7,8 isomers only

LB = Lower Bound, Where "ND", TEQ Conc = 0

MB = Medium Bound, Where "ND", TEQ Conc = (LOD/2) \* (TEF Factor)

UB = Upper Bound, Where "ND", TEQ Conc = LOD \* (TEF Factor)

RL = Reporting Limit

## REPORT OF LABORATORY ANALYSIS

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## Method 1613B Laboratory Control Spike Results

Lab Sample ID	LCS-70739	Matrix	Water
Filename	Y190529A_02	Dilution	NA
Total Amount Extracted	1000 mL	Extracted	05/23/2019 09:10
ICAL ID	Y190424	Analyzed	05/29/2019 10:25
CCal Filename	Y190529A_01	Injected By	ZMS
Method Blank ID	BLANK-70738		

Compound	Cs	Cr	Lower Limit	Upper Limit	% Rec.
2,3,7,8-TCDF	10	11	7.5	15.8	109
2,3,7,8-TCDD	10	12	6.7	15.8	121
1,2,3,7,8-PeCDF	50	53	40.0	67.0	105
2,3,4,7,8-PeCDF	50	52	34.0	80.0	105
1,2,3,7,8-PeCDD	50	50	35.0	71.0	100
1,2,3,4,7,8-HxCDF	50	53	36.0	67.0	107
1,2,3,6,7,8-HxCDF	50	50	42.0	65.0	100
2,3,4,6,7,8-HxCDF	50	51	35.0	78.0	102
1,2,3,7,8,9-HxCDF	50	50	39.0	65.0	100
1,2,3,4,7,8-HxCDD	50	57	35.0	82.0	113
1,2,3,6,7,8-HxCDD	50	56	38.0	67.0	112
1,2,3,7,8,9-HxCDD	50	58	32.0	81.0	116
1,2,3,4,6,7,8-HpCDF	50	55	41.0	61.0	110
1,2,3,4,7,8,9-HpCDF	50	50	39.0	69.0	100
1,2,3,4,6,7,8-HpCDD	50	50	35.0	70.0	100
OCDF	100	110	63.0	170.0	110
OCDD	100	110	78.0	144.0	114
2,3,7,8-TCDD-37Cl4	10	8.9	3.1	19.1	89
2,3,7,8-TCDF-13C	100	78	22.0	152.0	78
2,3,7,8-TCDD-13C	100	74	20.0	175.0	74
1,2,3,7,8-PeCDF-13C	100	83	21.0	192.0	83
2,3,4,7,8-PeCDF-13C	100	86	13.0	328.0	86
1,2,3,7,8-PeCDD-13C	100	88	21.0	227.0	88
1,2,3,4,7,8-HxCDF-13C	100	87	19.0	202.0	87
1,2,3,6,7,8-HxCDF-13C	100	91	21.0	159.0	91
2,3,4,6,7,8-HxCDF-13C	100	89	22.0	176.0	89
1,2,3,7,8,9-HxCDF-13C	100	90	17.0	205.0	90
1,2,3,4,7,8-HxCDD-13C	100	78	21.0	193.0	78
1,2,3,6,7,8-HxCDD-13C	100	73	25.0	163.0	73
1,2,3,4,6,7,8-HpCDF-13C	100	82	21.0	158.0	82
1,2,3,4,7,8,9-HpCDF-13C	100	92	20.0	186.0	92
1,2,3,4,6,7,8-HpCDD-13C	100	89	26.0	166.0	89
OCDD-13C	200	190	26.0	397.0	95

Cs = Concentration Spiked (ng/mL)

Cr = Concentration Recovered (ng/mL)

Rec. = Recovery (Expressed as Percent)

Control Limit Reference: Method 1613, Table 6, 10/94 Revision

R = Recovery outside of control limits

Nn = Value obtained from additional analysis

\* = See Discussion

## REPORT OF LABORATORY ANALYSIS

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## Method 1613B Laboratory Control Spike Results

Lab Sample ID	LCSD-70740	Matrix	Water
Filename	Y190529A_03	Dilution	NA
Total Amount Extracted	989 mL	Extracted	05/23/2019 09:10
ICAL ID	Y190424	Analyzed	05/29/2019 11:10
CCal Filename	Y190529A_01	Injected By	ZMS
Method Blank ID	BLANK-70738		

Compound	Cs	Cr	Lower Limit	Upper Limit	% Rec.
2,3,7,8-TCDF	10	10	7.5	15.8	103
2,3,7,8-TCDD	10	11	6.7	15.8	114
1,2,3,7,8-PeCDF	50	49	40.0	67.0	98
2,3,4,7,8-PeCDF	50	51	34.0	80.0	102
1,2,3,7,8-PeCDD	50	48	35.0	71.0	95
1,2,3,4,7,8-HxCDF	50	52	36.0	67.0	103
1,2,3,6,7,8-HxCDF	50	49	42.0	65.0	98
2,3,4,6,7,8-HxCDF	50	49	35.0	78.0	97
1,2,3,7,8,9-HxCDF	50	48	39.0	65.0	96
1,2,3,4,7,8-HxCDD	50	54	35.0	82.0	108
1,2,3,6,7,8-HxCDD	50	55	38.0	67.0	110
1,2,3,7,8,9-HxCDD	50	56	32.0	81.0	112
1,2,3,4,6,7,8-HpCDF	50	55	41.0	61.0	110
1,2,3,4,7,8,9-HpCDF	50	49	39.0	69.0	98
1,2,3,4,6,7,8-HpCDD	50	51	35.0	70.0	102
OCDF	100	99	63.0	170.0	99
OCDD	100	110	78.0	144.0	108
2,3,7,8-TCDD-37Cl4	10	8.7	3.1	19.1	87
2,3,7,8-TCDF-13C	100	73	22.0	152.0	73
2,3,7,8-TCDD-13C	100	70	20.0	175.0	70
1,2,3,7,8-PeCDF-13C	100	79	21.0	192.0	79
2,3,4,7,8-PeCDF-13C	100	81	13.0	328.0	81
1,2,3,7,8-PeCDD-13C	100	84	21.0	227.0	84
1,2,3,4,7,8-HxCDF-13C	100	81	19.0	202.0	81
1,2,3,6,7,8-HxCDF-13C	100	83	21.0	159.0	83
2,3,4,6,7,8-HxCDF-13C	100	83	22.0	176.0	83
1,2,3,7,8,9-HxCDF-13C	100	82	17.0	205.0	82
1,2,3,4,7,8-HxCDD-13C	100	74	21.0	193.0	74
1,2,3,6,7,8-HxCDD-13C	100	67	25.0	163.0	67
1,2,3,4,6,7,8-HpCDF-13C	100	73	21.0	158.0	73
1,2,3,4,7,8,9-HpCDF-13C	100	80	20.0	186.0	80
1,2,3,4,6,7,8-HpCDD-13C	100	78	26.0	166.0	78
OCDD-13C	200	180	26.0	397.0	91

Cs = Concentration Spiked (ng/mL)

Cr = Concentration Recovered (ng/mL)

Rec. = Recovery (Expressed as Percent)

Control Limit Reference: Method 1613, Table 6, 10/94 Revision

R = Recovery outside of control limits

Nn = Value obtained from additional analysis

\* = See Discussion

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Pace Analytical Services, LLC  
1700 Elm Street - Suite 200  
Minneapolis, MN 55414

Tel: 612-607-1700  
Fax: 612-607-6444

## Method 1613B

### Spike Recovery Relative Percent Difference (RPD) Results

Client                    Pace Analytical National

Spike 1 ID            LCS-70739                    Spike 2 ID            LCSD-70740  
Spike 1 Filename    Y190529A\_02                Spike 2 Filename    Y190529A\_03

Compound	Spike 1 %REC	Spike 2 %REC	%RPD
2,3,7,8-TCDF	109	103	5.7
2,3,7,8-TCDD	121	114	6.0
1,2,3,7,8-PeCDF	105	98	6.9
2,3,4,7,8-PeCDF	105	102	2.9
1,2,3,7,8-PeCDD	100	95	5.1
1,2,3,4,7,8-HxCDF	107	103	3.8
1,2,3,6,7,8-HxCDF	100	98	2.0
2,3,4,6,7,8-HxCDF	102	97	5.0
1,2,3,7,8,9-HxCDF	100	96	4.1
1,2,3,4,7,8-HxCDD	113	108	4.5
1,2,3,6,7,8-HxCDD	112	110	1.8
1,2,3,7,8,9-HxCDD	116	112	3.5
1,2,3,4,6,7,8-HpCDF	110	110	0.0
1,2,3,4,7,8,9-HpCDF	100	98	2.0
1,2,3,4,6,7,8-HpCDD	100	102	2.0
OCDF	110	99	10.5
OCDD	114	108	5.4

%REC = Percent Recovered

RPD = The difference between the two values divided by the mean value

## REPORT OF LABORATORY ANALYSIS

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**Method 1613B**  
**Initial Calibration (ICAL) - Response Factor Summary**

ICAL ID	F190508	Data Files:			Time	Injected
Calibration Date	05/08/2019	CS-1	F190508A_04	11:43	SMT	
Instrument	10MSHR05 (F)	CS-2	F190508A_03	11:02	SMT	
Column Phase	ZB5-MS 0.25mm	CS-3	F190508A_02	10:00	SMT	
Column ID No.	ZB5-MS-629919	CS-4	F190508A_06	13:46	SMT	
		CS-5	F190508A_05	13:05	SMT	
Isomer		CS-1	CS-2	CS-3	CS-4	CS-5
					Ave RF	%RSD
2,3,7,8-TCDF		0.8288	0.8067	0.8548	0.9247	0.8692
2,3,7,8-TCDD		0.7258	0.7466	0.9053	0.8472	0.8226
1,2,3,7,8-PeCDF		0.7848	0.8155	0.9265	0.9294	0.9605
2,3,4,7,8-PeCDF		0.9141	0.9583	1.0049	1.0616	1.0418
1,2,3,7,8-PeCDD		0.7512	0.7742	0.8516	0.8895	0.8836
1,2,3,4,7,8-HxCDF		1.0236	1.1127	1.1608	1.1726	1.2089
1,2,3,6,7,8-HxCDF		1.0014	1.0246	1.1187	1.1501	1.1270
2,3,4,6,7,8-HxCDF		1.0507	1.1409	1.1858	1.2495	1.2346
1,2,3,7,8,9-HxCDF		0.9781	1.0316	1.0873	1.1379	1.1166
1,2,3,4,7,8-HxCDD		0.8555	0.8687	0.9233	0.9402	0.9573
1,2,3,6,7,8-HxCDD		0.8314	0.9043	0.9052	0.9359	0.9026
1,2,3,7,8,9-HxCDD		0.8565	0.8763	0.9003	0.9266	0.9153
1,2,3,4,6,7,8-HpCDF		1.1049	1.1654	1.1997	1.2823	1.2449
1,2,3,4,7,8,9-HpCDF		1.1387	1.1656	1.2257	1.2892	1.2353
1,2,3,4,6,7,8-HpCDD		0.8917	0.9372	0.9719	1.0276	1.0178
OCDF		0.9256	0.9767	0.9981	1.0986	1.0703
OCDD		0.8835	0.9641	0.9292	0.9824	0.9725
Total PeCDF		0.8494	0.8869	0.9657	0.9955	1.0012
Total HxCDF		1.0134	1.0775	1.1381	1.1775	1.1718
Total HxCDD		0.8478	0.8831	0.9096	0.9343	0.9362
Total HpCDF		1.1218	1.1655	1.2127	1.2857	1.2401
2,3,7,8-TCDF-13C		1.2774	1.2742	1.2612	1.2461	1.2611
2,3,7,8-TCDD-13C		1.0321	1.0459	1.0771	1.0111	1.0470
2,3,7,8-TCDD-37Cl4		0.8169	0.9323	0.9533	0.9783	1.0309
1,2,3,7,8-PeCDF-13C		1.0537	1.0775	1.0227	1.0200	1.0592
2,3,4,7,8-PeCDF-13C		1.0512	1.0726	1.0678	1.0115	1.0827
1,2,3,7,8-PeCDD-13C		0.7608	0.7921	0.7924	0.7409	0.7983
1,2,3,4,7,8-HxCDF-13C		1.1556	1.0886	0.9809	1.1450	1.1002
1,2,3,6,7,8-HxCDF-13C		1.2681	1.2256	1.0928	1.2756	1.2214
2,3,4,6,7,8-HxCDF-13C		1.1349	1.0734	0.9911	1.1211	1.0874
1,2,3,7,8,9-HxCDF-13C		1.0058	0.9854	0.8807	0.9933	0.9866
1,2,3,4,7,8-HxCDD-13C		1.0164	0.9810	0.8696	1.0258	1.0080
1,2,3,6,7,8-HxCDD-13C		1.1202	1.1043	1.0208	1.1355	1.1310
1,2,3,4,6,7,8-HpCDF-13C		1.2491	1.2217	1.0875	1.2280	1.2341
1,2,3,4,7,8,9-HpCDF-13C		0.9880	1.0006	0.8771	0.9634	1.0185
1,2,3,4,6,7,8-HpCDD-13C		1.0980	1.0766	0.9822	1.0556	1.0983
OCDD-13C		0.9188	0.9233	0.8338	0.9071	0.9535

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**Method 1613B**  
**Initial Calibration (ICAL) - Isotope Ratio Summary**

ICAL ID	<b>F190508</b>	Data Files:	Time	Injected
Calibration Date	05/08/2019	CS-1	F190508A_04	11:43
Instrument	10MSHR05 (F)	CS-2	F190508A_03	11:02
Column Phase	ZB5-MS 0.25mm	CS-3	F190508A_02	10:00
Column ID No.	ZB5-MS-629919	CS-4	F190508A_06	13:46
		CS-5	F190508A_05	13:05

Isomer	CS-1	CS-2	CS-3	CS-4	CS-5	Limits
2,3,7,8-TCDF	0.76	0.79	0.75	0.76	0.78	0.65 - 0.89
2,3,7,8-TCDD	0.79	0.75	0.82	0.76	0.78	0.65 - 0.89
1,2,3,7,8-PeCDF	1.54	1.53	1.61	1.54	1.58	1.32 - 1.78
2,3,4,7,8-PeCDF	1.53	1.60	1.54	1.55	1.54	1.32 - 1.78
1,2,3,7,8-PeCDD	0.55	0.62	0.61	0.61	0.62	0.52 - 0.70
1,2,3,4,7,8-HxCDF	1.30	1.29	1.28	1.26	1.24	1.05 - 1.43
1,2,3,6,7,8-HxCDF	1.22	1.30	1.21	1.26	1.24	1.05 - 1.43
2,3,4,6,7,8-HxCDF	1.27	1.19	1.22	1.24	1.23	1.05 - 1.43
1,2,3,7,8,9-HxCDF	1.43	1.23	1.26	1.21	1.23	1.05 - 1.43
1,2,3,4,7,8-HxCDD	1.26	1.33	1.23	1.24	1.24	1.05 - 1.43
1,2,3,6,7,8-HxCDD	1.23	1.25	1.21	1.22	1.22	1.05 - 1.43
1,2,3,7,8,9-HxCDD	1.25	1.26	1.21	1.22	1.19	1.05 - 1.43
1,2,3,4,6,7,8-HpCDF	1.05	1.00	1.01	1.02	1.03	0.88 - 1.20
1,2,3,4,7,8,9-HpCDF	0.94	1.06	1.03	1.03	1.03	0.88 - 1.20
1,2,3,4,6,7,8-HpCDD	0.95	1.04	1.00	1.00	1.04	0.88 - 1.20
OCDF	0.94	0.93	0.91	0.90	0.92	0.76 - 1.02
OCDD	0.86	0.86	0.88	0.89	0.88	0.76 - 1.02
1,2,3,4-TCDD-13C	0.79	0.79	0.79	0.78	0.78	0.65 - 0.89
1,2,3,7,8,9-HxCDD-13C	1.25	1.24	1.25	1.24	1.21	1.05 - 1.43
2,3,7,8-TCDF-13C	0.76	0.77	0.78	0.75	0.77	0.65 - 0.89
2,3,7,8-TCDD-13C	0.77	0.78	0.78	0.77	0.77	0.65 - 0.89
1,2,3,7,8-PeCDF-13C	1.61	1.56	1.57	1.56	1.57	1.32 - 1.78
2,3,4,7,8-PeCDD-13C	1.54	1.57	1.58	1.56	1.57	1.32 - 1.78
1,2,3,7,8-PeCDF-13C	1.56	1.58	1.56	1.58	1.54	1.32 - 1.78
1,2,3,4,7,8-HxCDF-13C	0.52	0.51	0.51	0.52	0.52	0.43 - 0.59
1,2,3,6,7,8-HxCDF-13C	0.54	0.51	0.50	0.53	0.52	0.43 - 0.59
2,3,4,6,7,8-HxCDF-13C	0.52	0.51	0.53	0.53	0.53	0.43 - 0.59
1,2,3,7,8,9-HxCDF-13C	0.51	0.53	0.53	0.54	0.52	0.43 - 0.59
1,2,3,4,7,8-HxCDD-13C	1.24	1.26	1.25	1.26	1.24	1.05 - 1.43
1,2,3,6,7,8-HxCDD-13C	1.26	1.25	1.25	1.26	1.23	1.05 - 1.43
1,2,3,4,6,7,8-HpCDF-13C	0.45	0.43	0.44	0.45	0.44	0.37 - 0.51
1,2,3,4,7,8-HpCDF-13C	0.45	0.44	0.45	0.45	0.44	0.37 - 0.51
1,2,3,4,6,7,8-HpCDD-13C	1.01	1.03	1.03	1.03	1.06	0.88 - 1.20
OCDD-13C	0.89	0.91	0.88	0.91	0.90	0.76 - 1.02

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**Method 1613B**  
**Initial Calibration (ICAL) - Response Factor Summary**

ICAL ID	Y190424	Data Files:			Time	Injected
Calibration Date	04/24/2019	CS-1	Y190424A_03	09:24	SMT	
Instrument	10MSHR12 (Y)	CS-2	Y190424A_02	08:38	SMT	
Column Phase	ZB-5MS 0.25mm	CS-3	Y190424A_01	07:53	SMT	
Column ID No.	629920	CS-4	Y190424A_05	11:02	SMT	
		CS-5	Y190424A_04	10:17	SMT	
Isomer		CS-1	CS-2	CS-3	CS-4	CS-5
					Ave RF	%RSD
2,3,7,8-TCDF		0.8729	0.8432	0.8526	0.8809	0.8677
2,3,7,8-TCDD		0.8562	0.8631	1.0213	0.9314	0.9243
1,2,3,7,8-PeCDF		0.8497	0.8338	0.9059	0.8703	0.8977
2,3,4,7,8-PeCDF		0.9341	0.9523	0.9597	0.9958	1.0220
1,2,3,7,8-PeCDD		0.8708	0.8847	0.8802	0.8955	0.9296
1,2,3,4,7,8-HxCDF		1.1439	1.0967	1.1776	1.1920	1.2166
1,2,3,6,7,8-HxCDF		1.0426	1.0679	1.1267	1.1055	1.1348
2,3,4,6,7,8-HxCDF		1.1427	1.1191	1.1823	1.1952	1.1819
1,2,3,7,8,9-HxCDF		1.1115	1.0464	1.0803	1.1213	1.1439
1,2,3,4,7,8-HxCDD		0.8497	0.8896	0.9286	0.9506	0.9602
1,2,3,6,7,8-HxCDD		0.9208	0.9452	0.9241	0.9304	0.9459
1,2,3,7,8,9-HxCDD		0.8968	0.8994	0.9503	0.9396	0.9360
1,2,3,4,6,7,8-HpCDF		1.2000	1.2714	1.2416	1.2860	1.2831
1,2,3,4,7,8,9-HpCDF		1.2820	1.2744	1.2895	1.3181	1.3172
1,2,3,4,6,7,8-HpCDD		0.9267	0.9265	0.9872	1.0193	0.9930
OCDF		1.1150	1.0519	1.0618	1.1832	1.1582
OCDD		0.9688	0.9932	0.9766	1.0446	1.0045
Total PeCDF		0.8919	0.8930	0.9328	0.9331	0.9599
Total HxCDF		1.1101	1.0825	1.1417	1.1535	1.1693
Total HxCDD		0.8891	0.9114	0.9343	0.9402	0.9473
Total HpCDF		1.2410	1.2729	1.2655	1.3020	1.3002
2,3,7,8-TCDF-13C		1.4049	1.4326	1.4451	1.3939	1.4340
2,3,7,8-TCDD-13C		1.0663	1.1017	1.1494	1.0553	1.1115
2,3,7,8-TCDD-37Cl4		1.0375	1.0723	1.1203	1.0857	1.1501
1,2,3,7,8-PeCDF-13C		1.0503	1.0587	1.0139	1.0630	1.1470
2,3,4,7,8-PeCDF-13C		1.0164	1.0405	1.0773	1.0337	1.1320
1,2,3,7,8-PeCDD-13C		0.7177	0.7227	0.7651	0.7403	0.8302
1,2,3,4,7,8-HxCDF-13C		1.0423	1.0440	0.8810	1.0422	0.9857
1,2,3,6,7,8-HxCDF-13C		1.1538	1.1790	0.9850	1.1883	1.1393
2,3,4,6,7,8-HxCDF-13C		1.1032	1.0959	0.9475	1.1004	1.0598
1,2,3,7,8,9-HxCDF-13C		0.9479	0.9666	0.8920	0.9829	0.9583
1,2,3,4,7,8-HxCDD-13C		0.9555	0.9770	0.8521	0.9886	0.9648
1,2,3,6,7,8-HxCDD-13C		1.0622	1.0827	0.9902	1.0797	1.0742
1,2,3,4,6,7,8-HpCDF-13C		1.0365	1.0626	0.9680	1.0737	1.0649
1,2,3,4,7,8,9-HpCDF-13C		0.8316	0.8411	0.7866	0.8572	0.8769
1,2,3,4,6,7,8-HpCDD-13C		0.8976	0.9280	0.8651	0.9239	0.9580
OCDD-13C		0.6505	0.6988	0.6782	0.7086	0.7707
						0.7014
						6.37

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**Method 1613B**  
**Initial Calibration (ICAL) - Isotope Ratio Summary**

ICAL ID	<b>Y190424</b>	Data Files:	Time	Injected	
Calibration Date	04/24/2019	CS-1	Y190424A_03	09:24	SMT
Instrument	10MSHR12 (Y)	CS-2	Y190424A_02	08:38	SMT
Column Phase	ZB-5MS 0.25mm	CS-3	Y190424A_01	07:53	SMT
Column ID No.	629920	CS-4	Y190424A_05	11:02	SMT
		CS-5	Y190424A_04	10:17	SMT

Isomer	CS-1	CS-2	CS-3	CS-4	CS-5	Limits
2,3,7,8-TCDF	0.83	0.83	0.77	0.77	0.78	0.65 - 0.89
2,3,7,8-TCDD	0.83	0.80	0.76	0.77	0.77	0.65 - 0.89
1,2,3,7,8-PeCDF	1.43	1.56	1.53	1.53	1.55	1.32 - 1.78
2,3,4,7,8-PeCDF	1.53	1.60	1.54	1.59	1.56	1.32 - 1.78
1,2,3,7,8-PeCDD	0.65	0.62	0.61	0.60	0.61	0.52 - 0.70
1,2,3,4,7,8-HxCDF	1.26	1.27	1.26	1.27	1.27	1.05 - 1.43
1,2,3,6,7,8-HxCDF	1.26	1.30	1.26	1.27	1.29	1.05 - 1.43
2,3,4,6,7,8-HxCDF	1.26	1.27	1.26	1.28	1.25	1.05 - 1.43
1,2,3,7,8,9-HxCDF	1.16	1.18	1.26	1.25	1.26	1.05 - 1.43
1,2,3,4,7,8-HxCDD	1.18	1.22	1.24	1.24	1.22	1.05 - 1.43
1,2,3,6,7,8-HxCDD	1.30	1.26	1.25	1.23	1.23	1.05 - 1.43
1,2,3,7,8,9-HxCDD	1.31	1.24	1.26	1.23	1.22	1.05 - 1.43
1,2,3,4,6,7,8-HpCDF	1.14	1.11	1.04	1.04	1.03	0.88 - 1.20
1,2,3,4,7,8,9-HpCDF	0.96	1.11	1.00	1.05	1.02	0.88 - 1.20
1,2,3,4,6,7,8-HpCDD	1.03	1.05	1.05	1.03	1.05	0.88 - 1.20
OCDF	0.85	0.88	0.91	0.87	0.90	0.76 - 1.02
OCDD	0.76	0.91	0.88	0.88	0.89	0.76 - 1.02
1,2,3,4-TCDD-13C	0.78	0.78	0.79	0.78	0.80	0.65 - 0.89
1,2,3,7,8,9-HxCDD-13C	1.24	1.25	1.23	1.25	1.24	1.05 - 1.43
2,3,7,8-TCDF-13C	0.79	0.78	0.76	0.76	0.77	0.65 - 0.89
2,3,7,8-TCDD-13C	0.79	0.77	0.79	0.78	0.78	0.65 - 0.89
1,2,3,7,8-PeCDF-13C	1.53	1.56	1.55	1.56	1.57	1.32 - 1.78
2,3,4,7,8-PeCDF-13C	1.54	1.54	1.55	1.57	1.55	1.32 - 1.78
1,2,3,7,8-PeCDD-13C	1.56	1.55	1.59	1.59	1.61	1.32 - 1.78
1,2,3,4,7,8-HxCDF-13C	0.52	0.51	0.52	0.51	0.52	0.43 - 0.59
1,2,3,6,7,8-HxCDF-13C	0.52	0.51	0.54	0.51	0.51	0.43 - 0.59
2,3,4,6,7,8-HxCDF-13C	0.51	0.52	0.50	0.51	0.51	0.43 - 0.59
1,2,3,7,8,9-HxCDF-13C	0.52	0.53	0.52	0.50	0.50	0.43 - 0.59
1,2,3,4,7,8-HxCDD-13C	1.26	1.25	1.25	1.26	1.26	1.05 - 1.43
1,2,3,6,7,8-HxCDD-13C	1.23	1.21	1.22	1.25	1.24	1.05 - 1.43
1,2,3,4,6,7,8-HpCDF-13C	0.45	0.45	0.45	0.44	0.44	0.37 - 0.51
1,2,3,4,7,8-HpCDF-13C	0.44	0.45	0.46	0.44	0.45	0.37 - 0.51
1,2,3,4,6,7,8-HpCDD-13C	1.04	1.01	1.04	1.03	1.03	0.88 - 1.20
OCDD-13C	0.88	0.91	0.89	0.88	0.89	0.76 - 1.02

## REPORT OF LABORATORY ANALYSIS

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**Method 1613B Analysis Results  
PCDD/PCDF Calibration Verification  
Labeled Analytes**

Lab Name CS3/CPM-11321-155  
Filename Y190529A\_01  
Injected By ZMS  
Analyzed 05/29/2019 09:27

Instrument ID 10MSHR12 (Y)  
GC Column ID 629920  
ICAL ID Y190424

Native Isomers	m/z's Forming Ratio (1)	Ion Abund. Ratio	QC Limits (2)	Conc Found	Conc. Range (ng/ml) (3)
Labeled Compounds					
1,2,3,4-TCDD-13C	M/M+2	0.80	0.65 - 0.89	----	----
2,3,7,8-TCDD-13C	M/M+2	0.79	0.65 - 0.89	103.1	82 - 121
1,2,3,7,8-PeCDD-13C	M+2/M+4	1.55	1.32 - 1.78	99.9	62 - 160
1,2,3,4,7,8-HxCDD-13C	M+2/M+4	1.26	1.05 - 1.43	95.7	85 - 117
1,2,3,6,7,8-HxCDD-13C	M+2/M+4	1.24	1.05 - 1.43	90.7	85 - 118
1,2,3,7,8,9-HxCDD-13C	M+2/M+4	1.22	1.05 - 1.43	----	----
1,2,3,4,6,7,8-HpCDD-13C	M+2/M+4	1.04	0.88 - 1.20	105.4	72 - 138
OCDD-13C	M+2/M+4	0.93	0.76 - 1.02	238.3	96 - 415
2,3,7,8-TCDF-13C	M/M+2	0.77	0.65 - 0.89	103.8	71 - 140
1,2,3,7,8-PeCDF-13C	M+2/M+4	1.57	1.32 - 1.78	99.2	76 - 130
2,3,4,7,8-PeCDF-13C	M+2/M+4	1.58	1.32 - 1.78	105.8	77 - 130
1,2,3,4,7,8-HxCDF-13C	M/M+2	0.52	0.43 - 0.59	105.8	76 - 131
1,2,3,6,7,8-HxCDF-13C	M/M+2	0.52	0.43 - 0.59	101.9	70 - 143
2,3,4,6,7,8-HxCDF-13C	M/M+2	0.51	0.43 - 0.59	99.6	73 - 137
1,2,3,7,8,9-HxCDF-13C	M/M+2	0.50	0.43 - 0.59	106.9	74 - 135
1,2,3,4,6,7,8-HpCDF-13C	M/M+2	0.47	0.37 - 0.51	102.0	78 - 129
1,2,3,4,7,8,9-HpCDF-13C	M/M+2	0.46	0.37 - 0.51	109.8	77 - 129
Cleanup Standard					
2,3,7,8-TCDD-37Cl4	M+2/M+4	(4)		10.2	7.9 - 12.7

1. See Table 8, Method 1613, for m/z specifications.
2. Ion Abundance Ratio Control Limits from Table 9, Method 1613.
3. Contract-required concentration range as specified in Table 6, Method 1613, under VER (10/94 Revision).
4. No ion abundance ratio; report concentration found.

**REPORT OF LABORATORY ANALYSIS**

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Pace Analytical Services, LLC  
1700 Elm Street - Suite 200  
Minneapolis, MN 55414

Tel: 612-607-1700  
Fax: 612-607-6444

**Method 1613B Analysis Results  
PCDD/PCDF Calibration Verification  
Native Analytes**

Lab Name CS3/CPM-11321-155  
Filename Y190529A\_01  
Injected By ZMS  
Analyzed 05/29/2019 09:27

Instrument ID 10MSHR12 (Y)  
GC Column ID 629920  
ICAL ID Y190424

Native Isomers	m/z's Forming Ratio (1)	Ion Abund. Ratio	QC Limits (2)	Conc Found	Conc. Range (ng/ml) (3)
2,3,7,8-TCDD	M/M+2	0.77	0.65 - 0.89	11.6	7.8 - 12.9
1,2,3,7,8-PeCDD	M+2/M+4	0.62	0.52 - 0.70	51.5	39 - 65
1,2,3,4,7,8-HxCDD	M+2/M+4	1.23	1.05 - 1.43	52.0	39 - 64
1,2,3,6,7,8-HxCDD	M+2/M+4	1.28	1.05 - 1.43	52.7	39 - 64
1,2,3,7,8,9-HxCDD	M+2/M+4	1.22	1.05 - 1.43	54.3	41 - 61
1,2,3,4,6,7,8-HpCDD	M+2/M+4	1.05	0.88 - 1.20	52.5	43 - 58
OCDD	M+2/M+4	0.94	0.76 - 1.02	102.7	79 - 126
2,3,7,8-TCDF	M/M+2	0.76	0.65 - 0.89	10.5	8.4 - 12.0
1,2,3,7,8-PeCDF	M+2/M+4	1.63	1.32 - 1.78	54.4	41 - 60
2,3,4,7,8-PeCDF	M+2/M+4	1.60	1.32 - 1.78	50.9	41 - 61
1,2,3,4,7,8-HxCDF	M+2/M+4	1.28	1.05 - 1.43	49.5	45 - 56
1,2,3,6,7,8-HxCDF	M+2/M+4	1.26	1.05 - 1.43	50.7	44 - 57
2,3,4,6,7,8-HxCDF	M+2/M+4	1.24	1.05 - 1.43	51.4	44 - 57
1,2,3,7,8,9-HxCDF	M+2/M+4	1.27	1.05 - 1.43	49.6	45 - 56
1,2,3,4,6,7,8-HpCDF	M+2/M+4	1.06	0.88 - 1.20	52.0	45 - 55
1,2,3,4,7,8,9-HpCDF	M+2/M+4	1.06	0.88 - 1.20	52.3	43 - 58
OCDF	M+2/M+4	0.90	0.76 - 1.02	108.5	63 - 159

1. See Table 8, Method 1613, for m/z specifications.
2. Ion Abundance Ratio Control Limits from Table 9, Method 1613.
3. Contract-required concentration range as specified in Table 6, Method 1613, under VER (10/94 Revision).

**REPORT OF LABORATORY ANALYSIS**

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**Method 1613B Analysis Results  
PCDD/PCDF Calibration Verification  
Labeled Analytes**

Lab Name CS3/CPM-11321-155  
Filename F190529B\_14  
Injected By SMT  
Analyzed 05/29/2019 19:30

Instrument ID 10MSHR05 (F)  
GC Column ID ZB5-MS-629919  
ICAL ID F190508

Native Isomers	m/z's Forming Ratio (1)	Ion Abund. Ratio	QC Limits (2)	Conc Found	Conc. Range (ng/ml) (3)
Labeled Compounds					
1,2,3,4-TCDD-13C	M/M+2	0.78	0.65 - 0.89	----	----
2,3,7,8-TCDD-13C	M/M+2	0.76	0.65 - 0.89	101.5	82 - 121
1,2,3,7,8-PeCDD-13C	M+2/M+4	1.61	1.32 - 1.78	92.7	62 - 160
1,2,3,4,7,8-HxCDD-13C	M+2/M+4	1.24	1.05 - 1.43	90.9	85 - 117
1,2,3,6,7,8-HxCDD-13C	M+2/M+4	1.26	1.05 - 1.43	86.6	85 - 118
1,2,3,7,8,9-HxCDD-13C	M+2/M+4	1.25	1.05 - 1.43	----	----
1,2,3,4,6,7,8-HpCDD-13C	M+2/M+4	1.09	0.88 - 1.20	86.6	72 - 138
OCDD-13C	M+2/M+4	0.90	0.76 - 1.02	161.7	96 - 415
2,3,7,8-TCDF-13C	M/M+2	0.76	0.65 - 0.89	100.8	71 - 140
1,2,3,7,8-PeCDF-13C	M+2/M+4	1.60	1.32 - 1.78	94.6	76 - 130
2,3,4,7,8-PeCDF-13C	M+2/M+4	1.62	1.32 - 1.78	96.0	77 - 130
1,2,3,4,7,8-HxCDF-13C	M/M+2	0.52	0.43 - 0.59	93.8	76 - 131
1,2,3,6,7,8-HxCDF-13C	M/M+2	0.53	0.43 - 0.59	90.7	70 - 143
2,3,4,6,7,8-HxCDF-13C	M/M+2	0.53	0.43 - 0.59	93.8	73 - 137
1,2,3,7,8,9-HxCDF-13C	M/M+2	0.51	0.43 - 0.59	90.5	74 - 135
1,2,3,4,6,7,8-HpCDF-13C	M/M+2	0.45	0.37 - 0.51	83.0	78 - 129
1,2,3,4,7,8,9-HpCDF-13C	M/M+2	0.46	0.37 - 0.51	78.6	77 - 129
Cleanup Standard					
2,3,7,8-TCDD-37Cl4	M+2/M+4	(4)		10.0	7.9 - 12.7

1. See Table 8, Method 1613, for m/z specifications.
2. Ion Abundance Ratio Control Limits from Table 9, Method 1613.
3. Contract-required concentration range as specified in Table 6, Method 1613, under VER (10/94 Revision).
4. No ion abundance ratio; report concentration found.

**REPORT OF LABORATORY ANALYSIS**

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Pace Analytical Services, LLC  
1700 Elm Street - Suite 200  
Minneapolis, MN 55414

Tel: 612-607-1700  
Fax: 612-607-6444

**Method 1613B Analysis Results  
PCDD/PCDF Calibration Verification  
Native Analytes**

Lab Name CS3/CPM-11321-155  
Filename F190529B\_14  
Injected By SMT  
Analyzed 05/29/2019 19:30

Instrument ID 10MSHR05 (F)  
GC Column ID ZB5-MS-629919  
ICAL ID F190508

Native Isomers	m/z's Forming Ratio (1)	Ion Abund. Ratio	QC Limits (2)	Conc Found	Conc. Range (ng/ml) (3)
2,3,7,8-TCDD	M/M+2	0.77	0.65 - 0.89	11.0	7.8 - 12.9
1,2,3,7,8-PeCDD	M+2/M+4	0.62	0.52 - 0.70	51.9	39 - 65
1,2,3,4,7,8-HxCDD	M+2/M+4	1.20	1.05 - 1.43	51.2	39 - 64
1,2,3,6,7,8-HxCDD	M+2/M+4	1.25	1.05 - 1.43	52.0	39 - 64
1,2,3,7,8,9-HxCDD	M+2/M+4	1.22	1.05 - 1.43	53.6	41 - 61
1,2,3,4,6,7,8-HpCDD	M+2/M+4	1.03	0.88 - 1.20	49.8	43 - 58
OCDD	M+2/M+4	0.86	0.76 - 1.02	98.5	79 - 126
2,3,7,8-TCDF	M/M+2	0.85	0.65 - 0.89	9.4	8.4 - 12.0
1,2,3,7,8-PeCDF	M+2/M+4	1.53	1.32 - 1.78	52.7	41 - 60
2,3,4,7,8-PeCDF	M+2/M+4	1.60	1.32 - 1.78	51.2	41 - 61
1,2,3,4,7,8-HxCDF	M+2/M+4	1.23	1.05 - 1.43	49.7	45 - 56
1,2,3,6,7,8-HxCDF	M+2/M+4	1.27	1.05 - 1.43	49.6	44 - 57
2,3,4,6,7,8-HxCDF	M+2/M+4	1.27	1.05 - 1.43	50.5	44 - 57
1,2,3,7,8,9-HxCDF	M+2/M+4	1.25	1.05 - 1.43	52.3	45 - 56
1,2,3,4,6,7,8-HpCDF	M+2/M+4	1.02	0.88 - 1.20	51.0	45 - 55
1,2,3,4,7,8,9-HpCDF	M+2/M+4	1.06	0.88 - 1.20	51.2	43 - 58
OCDF	M+2/M+4	0.91	0.76 - 1.02	97.0	63 - 159

1. See Table 8, Method 1613, for m/z specifications.
2. Ion Abundance Ratio Control Limits from Table 9, Method 1613.
3. Contract-required concentration range as specified in Table 6, Method 1613, under VER (10/94 Revision).

**REPORT OF LABORATORY ANALYSIS**

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**Ana-Lab Corp.**  
**P.O. Box 9000**  
**Kilgore, TX 75663**  
**903/984-0551**

**LELAP-accredited #02008**

# Report

## Table of Contents

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Pace Analytical/TN  
12065 Lebanon Rd  
Mt Juliet, TN 37122

*Account*

**PAJL-A**

*Project*

**875014**

This report consists of this Table of Contents and the following pages:

<u>Report Name</u>	<u>Description</u>	<u>Pages</u>
<b>875014_r03_03_ProjectResults</b>	Ana-Lab Project P:875014 C:PAJL Project Results t:304	<b>2</b>
<b>875014_r10_05_ProjectQC</b>	Ana-Lab Project P:875014 C:PAJL Project Quality Control Groups	<b>1</b>
<b>875014_r99_09_CoC_1_of_1</b>	Ana-Lab CoC PAJL 875014_1_of_1	<b>3</b>
<b>Total Pages:</b>		<b>6</b>



**Corporate Shipping: 2600 Dudley Rd. Kilgore, TX 75662**



NELAP-accredited #T104704201-19-15



## Results

Printed: 05/29/2019 15:17

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875014

## Report To

Pace Analytical/TN  
12065 Lebanon Rd  
Mt Juliet, TN 37122

Account

PAJL-A

## Results

178562 WW-20190512-002-Day 10

Received: 05/22/2019

Non-Potable Water

Collected by: Client

Pace Analytical/TN

PO:

Taken: 05/12/2019 11:30:00

EPA 245.7 2

Prepared: 840382 05/29/2019 06:26:20 Analyzed 840544 05/29/2019 12:30:00 LPS

Parameter

Results

Units

RL

Flag

CAS

Bottle

N Mercury, Total (low level)

&lt;4.26

ng/L

4.26

7439-97-6

02

## Sample Preparation

178562 WW-20190512-002-Day 10

Received: 05/22/2019

Cooler Return

Prepared: 05/22/2019 17:00:00 Analyzed 05/22/2019 17:00:00 MG3

z Return Cooler/No bottles Require

Returned

EPA 245.7 2

Prepared: 840382 05/29/2019 06:26:20 Analyzed 840382 05/29/2019 06:26:20 LPS

N Low Level Mercury Liquid Metals

50/47

ml

01

Corporate Shipping: 2600 Dudley Rd. Kilgore, TX 75662

Corporate: 2600 Dudley Road Kilgore TX 75662





# Results

Printed: 05/29/2019 15:17

Page 2 of 2  
**875014**

Qualifiers:

We report results on an As Received or wet basis unless marked Dry Weight. Unless otherwise noted, testing was performed at Ana-labs corporate laboratory that holds the following Federal and State certificates: EPA Lab Number TX00063, US Department of Agriculture Soil Import Permit P330-17-00117, Texas Commission on Environmental Quality Commercial Drinking Water Lab Approval (Lab ID: TX219), Texas Commission on Environmental Quality NELAP T104704201-19-15, Louisiana Department of Environmental Quality Laboratory Certification (NELAP, LELAP) #02008, Louisiana Department of Health and Hospitals Drinking Water (NELAP) Certificate No LA026, Oklahoma Department of Environmental Quality TNI Laboratory Accreditation Program Certificate No. 2018-126, Arkansas Department of Environmental Quality Certification #18-068-0. The Accredited column designates accreditation by N -- NELAC, or z -- not covered under NELAC scope of accreditation.

These analytical results relate to the sample tested. This report may NOT be reproduced EXCEPT in FULL without written approval of Ana-Lab Corp. Unless otherwise specified, these test results meet the requirements of NELAC.

RL is the Reporting Limit (sample specific quantitation limit) and is at or above the Method Detection Limit (MDL). CAS is Chemical Abstract Service number. RL is our Reporting Limit, or Minimum Quantitation Level. The RL takes into account the Instrument Detection Limit (IDL), Method Detection Limit (MDL), and Practical Quantitation Limit (PQL), and any dilutions and/or concentrations performed during sample preparation (EQL). Our analytical result must be above this RL before we report a value in the 'Results' column of our report (without a 'J' flag). Otherwise, we report ND (Not Detected above RL), because the result is "<" (less than) the number in the RL column. MAL is Minimum Analytical Level and is typically from regulatory agencies. Unless we report a result in the result column, or interferences prevent it, we work to have our RL at or below the MAL.

Trey Peery, MA, Project Manager



Corporate Shipping: 2600 Dudley Rd. Kilgore, TX 75662

Corporate: 2600 Dudley Road Kilgore TX 75662





## Quality Control

Printed 05/29/2019

Page 1 of 1

875014

## Report To

Pace Analytical/TN  
12065 Lebanon Rd  
Mt Juliet, TN 37122

## Account

PAJL-A

Analytical Set **840544**

EPA 245.7 2

## AWRL/MRL C

<u>Parameter</u>		<u>Reading</u>	<u>Known</u>	<u>Units</u>	<u>Recover%</u>	<u>Limits%</u>	<u>File</u>
Mercury, Total (low level)		5.40	5.00	ng/L	108	70.0 - 130	119976589

## Blank

<u>Parameter</u>	<u>PrepSet</u>	<u>Reading</u>	<u>MDL</u>	<u>MQL</u>	<u>Units</u>	<u>File</u>
Mercury, Total (low level)	840382	ND	0.573	4.00	ng/L	119976590

## CCV

<u>Parameter</u>		<u>Reading</u>	<u>Known</u>	<u>Units</u>	<u>Recover%</u>	<u>Limits%</u>	<u>File</u>
Mercury, Total (low level)		9.80	10.0	ng/L	98.0	76.0 - 124	119976588
		10.2	10.0	ng/L	102	76.0 - 124	119976600
		10.2	10.0	ng/L	102	76.0 - 124	119976611
		10.3	10.0	ng/L	103	76.0 - 124	119976619

## ICL

<u>Parameter</u>		<u>Reading</u>	<u>Known</u>	<u>Units</u>	<u>Recover%</u>	<u>Limits%</u>	<u>File</u>
Mercury, Total (low level)		96.3	100	ng/L	96.3	90.0 - 110	119976586

## ICV

<u>Parameter</u>		<u>Reading</u>	<u>Known</u>	<u>Units</u>	<u>Recover%</u>	<u>Limits%</u>	<u>File</u>
Mercury, Total (low level)		9.70	10.0	ng/L	97.0	90.0 - 110	119976587

## LCS Dup

<u>Parameter</u>	<u>PrepSet</u>	<u>LCS</u>	<u>LCSD</u>		<u>Known</u>	<u>Limits%</u>	<u>LCS%</u>	<u>LCSD%</u>	<u>Units</u>	<u>RPD</u>	<u>Limit%</u>
Mercury, Total (low level)	840382	23.8	23.9		25.0	76.0 - 113	95.2	95.6	ng/L	0.419	50.0

## MSD

<u>Parameter</u>	<u>Sample</u>	<u>MS</u>	<u>MSD</u>	<u>UNK</u>	<u>Known</u>	<u>Limits</u>	<u>MS%</u>	<u>MSD%</u>	<u>Units</u>	<u>RPD</u>	<u>Limit%</u>
Mercury, Total (low level)	1785410	10.0	9.89	ND	26.6	67.0 - 111	37.6 *	37.2 *	ng/L	1.11	18.0
	1786058	23.3	23.2	0.851	26.6	67.0 - 111	84.4	84.0	ng/L	0.446	18.0

\* Out RPD is Relative Percent Difference:  $\text{abs}(r1-r2) / \text{mean}(r1,r2) * 100\%$ 

Recover% is Recovery Percent: result / known \* 100%

Blank - Method Blank; CCV - Continuing Calibration Verification; ICV - Initial Calibration Verification; AWRL/MRL C - Ambient Water Reporting Limit/Minimum Reporting Limit Check Std



1 of 3

875014 CoC Print Group 001 of 001

**Sub-Contract Chain of Custody**

**Batch Date/Time:** 05/15/19 11:12  
**Sub-Contract Lab:** ANALABKTX  
**Address:** 2600 Dudley Rd  
**City/State:** Kilgore, TX 75662-3730  
**Contact:** tayna.chitwood@analab.com

**WO:** WG1281435  
**Results Due Date:** 05/29/19  
**ESC Purchase Order #:** L1098388  
**Send Reports to:** Benita Miller  
**Email:** SuboutTeam@esclabsciences.com



12065 Lebanon Rd.  
Mt. Juliet, TN 37122  
call:(615)773-9756

Sample ID Container ID	Matrix	State	Collect Date	Description	Sample Number Lab Use Only	Sample Comments Lab Use Only
WW-20190512-002-DAY 10 28213413	GW	TX	05/12/19 11:30	Mercury 245.7	I. L1098388-02	Mercury 245.7

\*= Container used for multiple Samples and/or Analyses

Relinquished by: Mark Pace Date 5/21/19 1535  
Received by: FedEx Date 5/21/19 1000  
Relinquished by: FedEx Date 5/21/19 1000  
Received by: Eliza Junkin Date 5/22/19 1000

17856022

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875014 CoC Print Group 001 of 001

	<b>Document Name:</b> <b>Shipping Request</b>		Document Revised: 16 MAR 2015 Page 1 of 1
	<b>Document No.:</b> <b>F-MN-C-145-Rev.02</b>		Issuing Authority: Pace Minnesota Quality Office

**Shipping Request**

(circle one)

Date 5/21/19 Must Arrive By 5/22/19 **AM / PM** FedEx / SpeeDee / UPS  
 Senders Initials NB3 Shipping Account # \_\_\_\_\_ Dept. # 10-03

**Ship Package To:**

Recipients Name: Sample Receiving  
 Company Name: ANALABKTX  
 Street Address: 2600 Dudley Rd  
Kilgore, TX 75662-3730  
 \_\_\_\_\_  
 \_\_\_\_\_

Phone Number: \_\_\_\_\_

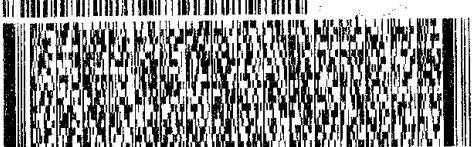
Other Information: 10475010001 GN1/1 -> send the container, packed on ice, next day delivery  
Use Pace National FedEx # 127364354  
10475010001 GN1/1 located @ G10-294 C17  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

Tracking Information:

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875014 CoC Print Group 001 of 001

5

ORIGIN ID: WITA 612 607-1700		SHIP DATE: 21 MAY 19
SAMPLE RECEIVING		ACT WT: 0.55 LB
PAGE ANALYTICAL		CAD: 285454/CAFE3111
1700 ELM ST SE		
MINNEAPOLIS, MN 55414,		BILL SENDER
UNITED STATES US		
<b>To:</b> SAMPLE RECEIVING ANA LAB 2600 DUDLEY RD		
<b>KILGORE TX 75662</b> <small>(903) 894-0661 REF: 1003-KS-5010            DEPT: 1003</small>		
Temp(°C)		
Therm#	Sorr.Fact	
<input type="checkbox"/> 6205		
<input type="checkbox"/> 15443		
<input type="checkbox"/> 6444		
<input checked="" type="checkbox"/> 4693	100	Time Tech ET
Date	5/22	10:00
 <span style="float: right;">FedEx Express</span>		
<span style="float: left;">TRK# 0201</span> <span style="float: left;">WED - 22 MAY 10:30A</span> <span style="float: left;">PRIORITY OVERNIGHT</span>		
<span style="float: left;">AH GCGA</span> <span style="float: right;">75662</span>		
<span style="float: left;">TX-US</span> <span style="float: right;">SHV</span>		
		

Part # 158148-454 RTT EXP 02/20

**Report Prepared for:**

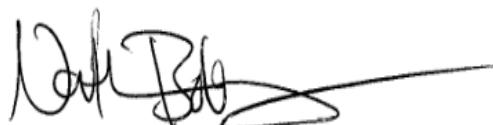
Benita Miller  
Pace Analytical National  
12065 Lebanon Road  
Mount Juliet TN 37122

**REPORT OF  
LABORATORY  
ANALYSIS  
FOR PFAAs****Report Prepared Date:**

June 6, 2019

**Report Information:**

Pace Project #: 10475010  
Sample Receipt Date: 05/15/2019  
Client Project #: L1098388: WG1280861  
Client Sub PO #: L1098388  
State Cert #: 2926.01

**Invoicing & Reporting Options:****This report has been reviewed by:**

June 06, 2019

Nathan Boberg, Project Manager  
612-360-0728  
(612) 607-6444 (fax)  
nathan.boberg@pacelabs.com

**Report of Laboratory Analysis**

This report should not be reproduced, except in full,  
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The results relate only to the samples included in this report.

## **DISCUSSION**

This report presents the results from the analysis performed on one water sample submitted by a representative of Pace-National. The sample was analyzed for one perfluorinated compound using a modified version of USEPA Method 537 Rev. 1.1. Reporting limits were set to the quantitation limits.

A laboratory method blank was prepared and analyzed with the sample batch as part of our routine quality control procedures. The results show the blank was free of the target perfluorinated compounds at the reporting limits. This indicates that the sample processing procedures did not significantly contribute to the analyte content determined for the sample material.

Laboratory spike samples were also prepared with the sample batch using clean reference matrix that had been fortified with native standards. The recovery results were within the method limits. The RPDs (relative percent differences) between one designated spike and its duplicate were within the method limits. These spikes indicate that extraction was performed as expected.

The recoveries of the isotopically-labeled surrogate standards in the sample extract was within the target ranges specified in the method.

It should be noted that Pace Analytical has not yet completed the certification process for all analytes in this method. Therefore, the results have been marked "N2" as qualified. Results for the low level spikes that were below the calibration range were flagged "J".



Pace Analytical Services, LLC  
1700 Elm Street - Suite 200  
Minneapolis, MN 55414

Tel: 612-607-1700  
Fax: 612-607-6444

## Minnesota Laboratory Certifications

Authority	Certificate #	Authority	Certificate #
A2LA	2926.01	Minnesota - Pet	1240
Alabama	40770	Mississippi	MN00064
Alaska - DW	MN00064	Missouri - DW	10100
Alaska - UST	17-009	Montana	CERT0092
Arizona	AZ0014	Nebraska	NE-OS-18-06
Arkansas - DW	MN00064	Nevada	MN00064
Arkansas - WW	88-0680	New Hampshire	2081
CNMI Saipan	MP0003	New Jersey (NE)	MN002
California	2929	New York	11647
Colorado	MN00064	North Carolina	27700
Connecticut	PH-0256	North Carolina -	27700
EPA Region 8+	via MN 027-053	North Carolina -	530
Florida (NELAP)	E87605	North Dakota	R-036
Georgia	959	Ohio - DW	41244
Guam	17-001r	Ohio - VAP	CL101
Hawaii	MN00064	Oklahoma	9507
Idaho	MN00064	Oregon - Primar	MN300001
Illinois	200011	Oregon - Secon	MN200001
Indiana	C-MN-01	Pennsylvania	68-00563
Iowa	368	Puerto Rico	MN00064
Kansas	E-10167	South Carolina	74003
Kentucky - DW	90062	South Dakota	NA
Kentucky - WW	90062	Tennessee	TN02818
Louisiana - DE	03086	Texas	T104704192
Louisiana - DW	MN00064	Utah (NELAP)	MN00064
Maine	MN00064	Virginia	460163
Maryland	322	Washington	C486
Massachusetts	M-MN064	West Virginia -	382
Michigan	9909	West Virginia -	9952C
Minnesota	027-053-137	Wisconsin	999407970
Minnesota - De	via MN 027-053	Wyoming - UST	2926.01

## REPORT OF LABORATORY ANALYSIS

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## Reporting Flags

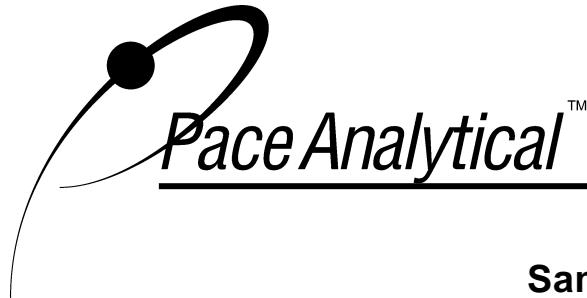
- A = Reporting Limit based on signal to noise
- B = Less than 10x higher than method blank level
- C = Result obtained from confirmation analysis
- D = Result obtained from analysis of diluted sample
- E = Exceeds calibration range
- I = Interference present
- J = Estimated value
- L = Suppressive interference, analyte may be biased low
- Nn = Value obtained from additional analysis
- P = PCDEInterference
- R = Recovery outside target range
- S = Peak saturated
- U = Analyte not detected
- V = Result verified by confirmation analysis
- X = %D Exceeds limits
- Y = Calculated using average of daily RFs
- \* = See Discussion

## REPORT OF LABORATORY ANALYSIS

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## **Appendix A**

### **Sample Management**



Pace Analytical Services, Inc.  
1700 Elm Street - Suite 200  
Minneapolis, MN 55414

Tel: 612-607-1700  
Fax: 612-607-6444

## Sample ID Cross Reference

**Client Sample ID**

WW-20190512-002-DAY 10

**Pace Sample ID**

10475010001

**Date Received**

05/15/2019

**Sample Type**

Water

## REPORT OF LABORATORY ANALYSIS

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10475010

Page : 1 Of 1

Section A  
Required Client Information:  
Report ID: 10475010\_PEA\_A\_DERSection B  
Required Project Information:

## CHAIN-OF-CUSTODY / Analytical Request Docu

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed.

Company: Pace Analytical National	Report To: Pace Analytical National Subout Team	Section C Invoice Information:
Address: 12065 Lebanon Road	Copy To:	Attention: Art Saunders
Mount Juliet, TN 37122		Company Name:
Email: SuboutTeam@pacenational.com	Purchase Order #: L1098388	Address:
Phone: (615)773-9756	Project Name: na	Pace Quote:
Requested Due Date: 29-May	Project #: na	Pace Project Manager: Nathan Boberg
		Pace Profile #: 38076

Regulatory Agency:

State / Location:

DE

ITEM #	SAMPLE ID <small>One Character per box. (A-Z, 0-9 /, -) Sample IDs must be unique</small>	MATRIX Drinking Water Water Waste Water Product Soil/Solid Oil Wipe Air Other Tissue	CODE DW WT WW P SL OL WP AR OT TS	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED				SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives										Analyses Test Y/N	Requested Analysis: Filtered (Y/N)									
						START		END				Preservatives											Requested Analysis: Filtered (Y/N)									
						DATE	TIME	DATE	TIME			H <sub>2</sub> SO <sub>4</sub>	HNO <sub>3</sub>	HCl	NaOH	Na <sub>2</sub> SO <sub>3</sub>	Methanol	Other	QC3. Dioxins/FURANS melt	PCBs	PCP		PCB	PCP	PCB	PCP	PCB	PCP	PCB	PCP	PCB	PCP
1	WW-20190512-002-DAY 10	WT			12-May	11:30						X																				
2																																
3																																
4																																
5																																
6																																
7																																
8																																
9																																
10																																
11																																
12																																

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS
Pace Analytical National Batch: WG1280861	Gabi Flensburg	Steve Shultz	14-May	15:08	David J. Pace	2019 04 09	1.2 4 4 4
Pace Analytical National SDGs: L1098388							
Location: Minneapolis, MN 55414							

SAMPLER NAME AND SIGNATURE	
PRINT Name of SAMPLER:	
SIGNATURE of SAMPLER:	DATE Signed:
TEMP in C	
Received on Ice (Y/N)	
Custody Sealed (Y/N)	
Cooler (Y/N)	
Samples Intact (Y/N)	

	Document Name: <b>Sample Condition Upon Receipt Form</b>	Document Revised: 09May2019 Page 1 of 1
	Document No.: <b>F-MN-L-213-rev.28</b>	Issuing Authority: <b>Pace Minnesota Quality Office</b>

<b>Sample Condition Upon Receipt</b>	<b>Client Name:</b> <i>Pace National</i>	<b>Project #:</b> <b>WO# : 10475010</b>
Courier:	<input checked="" type="checkbox"/> Fed Ex <input type="checkbox"/> UPS <input type="checkbox"/> USPS <input type="checkbox"/> Client <input type="checkbox"/> Pace <input type="checkbox"/> SpeedDee <input type="checkbox"/> Commercial <input type="checkbox"/> See Exception	<b>PM: NB3</b> <b>Due Date: 05/30/19</b> <b>CLIENT: ESC_TN</b>
Tracking Number:	1023 1351 5011	
Custody Seal on Cooler/Box Present?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Seals Intact? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No    Biological Tissue Frozen? <input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A
Packing Material:	<input type="checkbox"/> Bubble Wrap <input checked="" type="checkbox"/> Bubble Bags <input type="checkbox"/> None <input type="checkbox"/> Other: _____	Temp Blank? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Thermometer:	<input type="checkbox"/> T1(0461) <input type="checkbox"/> T2(1336) <input type="checkbox"/> T3(0459) <input checked="" type="checkbox"/> T4(0254) <input type="checkbox"/> TS(0489)	Type of Ice: <input checked="" type="checkbox"/> Wet <input type="checkbox"/> Blue <input type="checkbox"/> None <input type="checkbox"/> Dry <input type="checkbox"/> Melted
Note: Each West Virginia Sample must have temp taken (no temp blanks)		
Temp should be above freezing to 6°C	Cooler Temp Read w/temp blank: <u>1.0</u> °C	Average Corrected Temp See Exceptions (no temp blank only): <u>1.2</u> °C
Correction Factor: <u>+0.2</u>	Cooler Temp Corrected w/temp blank: <u>1.2</u> °C	
USDA Regulated Soil: ( <input checked="" type="checkbox"/> N/A, water sample/Other: _____)	Date/Initials of Person Examining Contents: <u>5/15/19</u>	
Did samples originate in a quarantine zone within the United States: AL, AR, CA, FL, GA, ID, LA, MS, NC, NM, NY, OK, OR, SC, TN, TX or VA (check maps)? <input type="checkbox"/> Yes <input type="checkbox"/> No	Did samples originate from a foreign source (internationally, including Hawaii and Puerto Rico)? <input type="checkbox"/> Yes <input type="checkbox"/> No	
If Yes to either question, fill out a Regulated Soil Checklist (F-MN-Q-338) and include with SCUR/COC paperwork.		
<b>COMMENTS:</b>		
Chain of Custody Present and Filled Out?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	1.
Chain of Custody Relinquished?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	2.
Sampler Name and/or Signature on COC?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	3.
Samples Arrived within Hold Time?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	4.
Short Hold Time Analysis (<72 hr)?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	5. <input type="checkbox"/> Fecal Coliform <input type="checkbox"/> HPC <input type="checkbox"/> Total Coliform/E coli <input type="checkbox"/> BOD/cBOD <input type="checkbox"/> Hex Chrome <input type="checkbox"/> Turbidity <input type="checkbox"/> Nitrate <input type="checkbox"/> Nitrite <input type="checkbox"/> Orthophos <input type="checkbox"/> Other
Rush Turn Around Time Requested?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	6.
Sufficient Volume?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	7.
Correct Containers Used? -Pace Containers Used?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	8.
Containers Intact?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	9.
Field Filtered Volume Received for Dissolved Tests?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	10. Is sediment visible in the dissolved container? <input type="checkbox"/> Yes <input type="checkbox"/> No
Is sufficient information available to reconcile the samples to the COC?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	11. If no, write ID/ Date/Time on Container Below: <u>See Exception</u> <input type="checkbox"/>
Matrix: <input checked="" type="checkbox"/> Water <input type="checkbox"/> Soil <input type="checkbox"/> Oil <input type="checkbox"/> Other		
All containers needing acid/base preservation have been checked?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	12. Sample #  <input type="checkbox"/> NaOH <input type="checkbox"/> HNO <sub>3</sub> <input type="checkbox"/> H <sub>2</sub> SO <sub>4</sub> <input type="checkbox"/> Zinc Acetate
All containers needing preservation are found to be in compliance with EPA recommendation? (HNO <sub>3</sub> , H <sub>2</sub> SO <sub>4</sub> , <2pH, NaOH>9 Sulfide, NaOH>12 Cyanide)	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	Positive for Res. <input type="checkbox"/> Yes Chlorine? <input type="checkbox"/> No    pH Paper Lot# <u>See Exception</u> <input type="checkbox"/> Res. Chlorine    0-6 Roll    0-6 Strip    0-14 Strip
Headspace in VOA Vials (greater than 6mm)?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	13. <u>See Exception</u> <input type="checkbox"/>
Trip Blank Present?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	14. Pace Trip Blank Lot # (if purchased): _____
<b>CLIENT NOTIFICATION/RESOLUTION</b>		Field Data Required? <input type="checkbox"/> Yes <input type="checkbox"/> No
Person Contacted: _____	Date/Time: _____	
Comments/Resolution: _____		
Project Manager Review: <u>Jathan Roberson</u>	Date: <u>5/20/19</u>	
Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office ( i.e. out of hold, incorrect preservative, out of temp, incorrect containers).		
Labeled by: <u>H</u>		

**QC Matric lot #:** 187814  
**Time of Spiking:** 05/23/19 00:00  
**SPE Cartridge:** S322-0024  
**Balance:** 10BALQ

**TRIZMA Lot #:** 183004/18F285  
**Optima H2O Lot #:** 187814  
**Methanol Lot #:** 187805

**Extract Start:** 05/23/19 00:00  
**Extract End:** 05/23/19 00:00  
**Setup By:** QL

	Lot Number	Amount	Initials	Expiration	Dispenser	Witness
<b>Internal</b>	12332-190	100	NH	11/22/19	Q503	wm
<b>Surrogate</b>	12332-187	100	QL	11/10/19	Q503	
<b>Native Lo</b>	12332-167	10	QL	10/19/19	Q523	
<b>Native Mid</b>	12332-167	100	QL	10/19/19	Q503	
<b>Native Hi</b>						
<b>GenX IS</b>	12332-175	200	QL	10/25/19	Q497	

#	Sample ID	GenX IS	Surrogate	Natives	Full Bottle Weight	Empty Bottle Weight	Amount Extracted	Comments
1	BLANK-70748	X	X		286.9	36.9	250.0	
2	LCS-70749	X	X	X	278.7	36.9	241.8	
3	LCS-70750	X	X	X	281.4	37.1	244.3	
4	LCSD-70751	X	X	X	277.9	36.1	241.8	
5	10475010001	X	X		283.4	37.4	246.0	
6	10475128001	X	X		291.3	36.3	254.9	
7	10475799001	X	X		281.5	37.6	243.9	
8	10475940001	X	X		282.7	37.2	245.5	
9	10475943001	X	X		285.6	37.5	248.1	
10	10475942001	X	X		281.6	37.7	243.8	
11	10475944001	X	X		282.7	37.3	245.4	
12	10475899001	X	X		290.1	36.5	253.5	
13	10475899002	X	X		286.4	36.3	250.1	
14	10475899003	X	X		285.6	36.3	249.3	
15	10475899004	X	X		284.6	36.6	247.9	
16	10475899005	X	X		294.5	36.6	257.9	
17	10475899006	X	X		293.9	36.6	257.4	
18	10475899007	X	X		289.2	36.9	252.3	
19	10475899008	X	X		289.9	36.8	253.1	
20	10475899009	X	X		290.7	36.5	254.2	
21	10475899010	X	X		290.6	36.4	254.2	
22	10475899011	X	X		291.3	36.7	254.5	
23	10475942001-DUP	X	X		281.6	36.9	244.7	



EB-24667

## **Appendix B**

### **Sample Analysis Summary**



Pace Analytical Services, LLC

1700 Elm Street, Suite 200

Minneapolis, MN 55414

(612) 607-1700

**Method 537 (Modified)**  
Sample Analysis Summary

Client's Sample ID	WW-20190512-002-DAY 10	Date Extracted	05/23/2019
Lab Sample ID	10475010001	Total Amount Extracted	246 mL
Filename	B190528D_028	ICAL ID	
Matrix	Water	Starting CCal	B190528D_026
Collected	05/12/2019	Ending CCal	B190528D_036
Received	05/15/2019	Method Blank Filename	B190528D_006

Compound	Concentration (ng/L)	PQL (ng/L)	MDL (ng/L)	Dilution	Analyzed	CAS No.	Qual.
PFOS	ND	2.0	0.63	1	05/29/2019 11:46	1763-23-1	N2

**Surrogate Standards**

SS Compound	Spiked	Found	%Recovery	Limits	Pass/Fail
13C2_PFHxA	2.0	1.7	84	70 - 130	Pass
13C2_PFDA	2.0	1.8	91	70 - 130	Pass
d5-EtFOSAA	8.0	6.5	81	70 - 130	Pass

**Internal Standards**

IS Compound	Area	Ical Limits	CCV Limits	Pass/Fail

N2 = The lab does not hold NELAC/TNI accreditation for this parameter but other accreditations/certifications may apply. A complete list of accreditations/certifications is available upon request.

## **Appendix C**

### **QC and Calibration Results Summary**



Pace Analytical Services, LLC

1700 Elm Street, Suite 200

Minneapolis, MN 55414

(612) 607-1700

**Method 537 (Modified) Blank Analysis Summary**

Lab Sample ID	BLANK-70748	Total Amount Extracted	250 mL
Filename	B190528D_006	ICAL ID	190528A02
Matrix	Water	Starting CCal	B190528D_002
Date Extracted	05/23/2019	Ending CCal	B190528D_017

Compound	Concentration (ng/L)	PQL (ng/L)	MDL (ng/L)	Dilution	Analyzed	CAS No.	Qual.
PFOS	ND	1.9	0.62	1	05/29/2019 07:27	1763-23-1	N2

**Surrogate Standards**

SS Compound	Spiked	Found	%Recovery	Limits	Pass/Fail
13C2_PFHxA	2.0	1.4	72	70 - 130	Pass
13C2_PFDA	2.0	1.8	90	70 - 130	Pass
d5-EtFOSAA	8.0	6.6	83	70 - 130	Pass

**Internal Standards**

IS Compound	Area	Ical Limits	CCV Limits	Pass/Fail
13C3_PFPPOPrA	162593	112299 - 336896	144803 - 289606	Pass
13C2_PFOA	446836	213002 - 639005	303170 - 606340	Pass
13C4_PFOS	582591	281769 - 845307	406916 - 813832	Pass
d3-MeFOSAA	377224	170979 - 512936	245751 - 491502	Pass

50-150% of Ical area

70-140% of the preceding CCV area

N2 = The lab does not hold NELAC/TNI accreditation for this parameter but other accreditations/certifications may apply. A complete list of accreditations/certifications is available upon request.



Pace Analytical Services, LLC

1700 Elm Street, Suite 200

Minneapolis, MN 55414

(612) 607-1700

**Method 537 (Modified) Laboratory Control Sample (LCS)**

LCS Lab Sample ID	LCS-70749	Matrix	Water
LCS Filename	B190528D_007	Dilution	1
Total Amount Extracted	242mL	Extracted	05/23/2019
ICAL ID	190528A02	Analyzed	05/29/2019 07:39
Start CCal Filename	B190528D_002	Injected By	WM
End CCal Filename	B190528D_017		
Method Blank Filename	B190528D_006		

Compound	Spiked (ug/L)	Recovered (ug/L)	Recovery %	Limits
PFOS	0.0020	0.0019 J	98	50.0 - 150.0

**Surrogate Standards**

SS Compound	Spiked	Found	%Recovery	Limits	Pass/Fail
13C2_PFHxA	2.0	1.5	76	70 - 130	Pass
13C2_PFDA	2.0	1.7	85	70 - 130	Pass
d5-EtFOSAA	8.0	6.0	75	70 - 130	Pass

**Internal Standards**

IS Compound	Area	Ical Limits	CCV Limits	Pass/Fail
13C3_PFPPrOPrA	163024	112299 - 336896	144803 - 289606	Pass
13C2_PFOA	458128	213002 - 639005	303170 - 606340	Pass
13C4_PFOS	596588	281769 - 845307	406916 - 813832	Pass
d3-MeFOSAA	405275	170979 - 512936	245751 - 491502	Pass

50-150% of Ical area

70-140% of the preceding CCV area



Pace Analytical Services, LLC

1700 Elm Street, Suite 200

Minneapolis, MN 55414

(612) 607-1700

**Method 537 (Modified) Laboratory Control Sample (LCS)**

LCS Lab Sample ID	LCS-70750	Matrix	Water
LCS Filename	B190528D_008	Dilution	1
Total Amount Extracted	244mL	Extracted	05/23/2019
ICAL ID	190528A02	Analyzed	05/29/2019 07:51
Start CCAL Filename	B190528D_002	Injected By	WM
End CCAL Filename	B190528D_017		
Method Blank Filename	B190528D_006		

Compound	Spiked (ug/L)	Recovered (ug/L)	Recovery %	Limits
PFOS	0.020	0.021	109	70.0 - 130.0

**Surrogate Standards**

SS Compound	Spiked	Found	%Recovery	Limits	Pass/Fail
13C2_PFHxA	2.0	1.8	91	70 - 130	Pass
13C2_PFDA	2.0	1.9	96	70 - 130	Pass
d5-EtFOSAA	8.0	7.4	92	70 - 130	Pass

**Internal Standards**

IS Compound	Area	Ical Limits	CCV Limits	Pass/Fail
13C3_PFPPrOPrA	194865	112299 - 336896	144803 - 289606	Pass
13C2_PFOA	438275	213002 - 639005	303170 - 606340	Pass
13C4_PFOS	560959	281769 - 845307	406916 - 813832	Pass
d3-MeFOSAA	363068	170979 - 512936	245751 - 491502	Pass

50-150% of Ical area

70-140% of the preceding CCV area



Pace Analytical Services, LLC

1700 Elm Street, Suite 200

Minneapolis, MN 55414

(612) 607-1700

**Method 537 (Modified) Laboratory Control Sample Duplicate (LCSD)**

LCSD Lab Sample ID	LCSD-70751	LCS Filename	B190528D_007
LCSD Filename	B190528D_009	Matrix	Water
Total Amount Extracted	242mL	Dilution	1
ICAL ID	190528A02	Extracted	05/23/2019
Start CCal Filename	B190528D_002	Analyzed	05/29/2019 08:02
End CCal Filename	B190528D_017	Injected By	WM
Method Blank Filename	B190528D_006		

Compound	Spiked (ug/L)	Recovered (ug/L)	Recovery %	Recovery Limits	RPD %
----------	------------------	---------------------	---------------	--------------------	----------

PFOS	0.0020	0.0020	103	50.0 - 150.0	5
------	--------	--------	-----	--------------	---

**Surrogate Standards**

SS Compound	Spiked	Found	%Recovery	Limits	Pass/Fail
13C2_PFHxA	2.0	1.7	87	70 - 130	Pass
13C2_PFDA	2.0	2.0	98	70 - 130	Pass
d5-EtFOSAA	8.0	7.4	92	70 - 130	Pass

**Internal Standards**

IS Compound	Area	Ical Limits	CCV Limits	Pass/Fail
13C3_PFPPOPrA	202548	112299 - 336896	144803 - 289606	Pass
13C2_PFOA	479159	213002 - 639005	303170 - 606340	Pass
13C4_PFOS	593827	281769 - 845307	406916 - 813832	Pass
d3-MeFOSAA	387292	170979 - 512936	245751 - 491502	Pass

50-150% of Ical area

70-140% of the preceding CCV area

**PFAA Initial Calibration Response Factor Summary**

ICAL ID	<b>190528A02</b>	Data Files:	CS-1	B190528A_008	09:18
Calibration Date	05/28/2019		CS-2	B190528A_009	09:30
Instrument	10LCMS02		CS-3	B190528A_003	08:20
Column Phase	C18		CS-4	B190528A_004	08:31
Column ID No.	H18-061776		CS-5	B190528A_005	08:43
Analyst	NH		CS-6	B190528A_006	08:55

**Response Factors**

Compound	Type	CAL1	CAL2	CAL3	CAL4	CAL5	CAL6	Slope	R <sup>2</sup>
13C3_PFPrOPrA	L	14900	14000	13400	14100	13700	14100	14000	0.999
13C2_PFOA	L	216000	216000	214000	212000	217000	204000	213000	1.000
13C4_PFOS	L	100000	102000	98900	96600	96600	94500	98200	0.999
d3-MeFOSAA	L	42900	44200	43400	42300	41900	41700	42700	1.000
13C2_PFHxA	L	1.14	1.11	1.13	1.13	1.09	1.13	1.12	1.000
13C2_PFDA	L	5.18	5.04	5.41	5.26	5.36	5.08	5.22	0.999
d5-EtFOSAA	L	0.866	0.804	0.770	0.761	0.796	0.749	0.791	0.998
PFBA	L	1.01	0.895	0.906	0.915	0.855	0.881	0.878	1.000
PFPeA	L	1.02	1.01	1.03	1.01	0.968	0.977	0.978	1.000
PFBS	L	0.469	0.430	0.451	0.440	0.432	0.445	0.442	1.000
PFHxA	L	1.12	1.06	1.06	1.05	1.02	1.02	1.03	1.000
PFPrOPrA	L	1.79	1.54	1.48	1.36	1.39	1.26	1.29	0.998
PFHpA	L	1.16	1.05	1.09	1.10	0.993	1.02	1.02	1.000
NaDONA	L	17.6	17.3	18.6	17.0	17.3	14.9	15.5	0.995
PFHxS	L	0.369	0.357	0.361	0.358	0.352	0.363	0.361	1.000
PFOA	L	0.975	0.969	1.00	0.982	0.934	0.943	0.944	1.000
PFNA	L	1.90	1.87	1.77	1.82	1.86	1.72	1.75	0.999
PFOS	L	0.986	0.992	1.07	1.10	1.03	1.02	1.03	1.000
PFDA	L	4.20	4.09	4.42	4.43	4.31	4.08	4.15	0.999
PFUdA	L	7.57	6.71	7.21	7.17	7.12	6.53	6.68	0.998
N-MeFOSAA	L	1.12	1.06	1.12	1.06	1.09	1.09	1.09	1.000
N-EtFOSAA	L	1.25	1.14	1.16	1.12	1.19	1.08	1.10	0.998
PFDS	L	2.69	2.47	2.53	2.55	2.64	2.55	2.56	1.000
PFDoA	L	4.82	4.75	4.97	4.86	4.89	4.67	4.73	1.000
PFTrDA	L	5.18	4.60	4.97	4.95	4.82	4.61	4.67	0.999
PFTeDA	L	1.86	1.74	1.86	1.87	1.93	1.85	1.87	1.000
PFHxDA	L	3.34	2.94	3.41	3.53	3.31	3.26	3.28	1.000
PFODA	L	1.54	1.53	1.60	1.70	1.62	1.62	1.62	1.000

Slope: Linear calibration

**PFAA Initial Calibration Recovery Summary**

ICAL ID	<b>190528A02</b>	Data Files:	CS-1	B190528A_008	09:18
Calibration Date	05/28/2019		CS-2	B190528A_009	09:30
Instrument	10LCMS02		CS-3	B190528A_003	08:20
Column Phase	C18		CS-4	B190528A_004	08:31
Column ID No.	H18-061776		CS-5	B190528A_005	08:43
Analyst	NH		CS-6	B190528A_006	08:55

**%Recoveries**

Compound	CAL1	CAL2	CAL3	CAL4	CAL5	CAL6
13C3_PFPPrOPrA	106	100	96	100	98	100
13C2_PFOA	101	101	101	99	102	96
13C4_PFOS	102	104	101	98	98	96
d3-MeFOSAA	100	103	102	99	98	98
13C2_PFHxA	102	99	101	101	97	101
13C2_PFDA	99	96	104	101	103	97
d5-EtFOSAA	110	102	97	96	101	95
PFBA	115	102	103	104	97	100
PFPeA	104	104	105	103	99	100
PFBS	106	97	102	99	98	101
PFHxA	109	103	104	103	100	100
PFPrOPrA	139	119	114	105	107	98
PFHpA	114	103	107	108	98	100
NaDONA	114	111	120	110	111	96
PFHxS	102	99	100	99	98	101
PFOA	103	103	106	104	99	100
PFNA	109	107	101	104	106	98
PFOS	96	97	104	107	101	99
PFDA	101	99	107	107	104	98
PFUdA	113	100	108	107	107	98
N-MeFOSAA	103	97	102	98	100	100
N-EtFOSAA	113	103	106	102	108	98
PFDS	105	96	99	100	103	99
PFDoA	102	100	105	103	103	99
PFTrDA	111	99	106	106	103	99
PFTeDA	99	93	99	100	103	99
PFHxDA	102	90	104	108	101	99
PFODA	95	94	99	105	100	100



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1700 Elm Street, Suite 200

Minneapolis, MN 55414

(612) 607-1700

### Method 537 (Modified) Calibration Verification Summary ICV

Lab Calibration ID ICV-12332-189  
Run File Name B190528A\_010  
Injected By WM  
Analyzed 05/28/2019 09:42  
Instrument ID 10LCMS02  
Column ID H18-061776  
Ical ID 190528A02

Compound	Known Conc.	Conc. Found	%Recovery	Recovery Limits	Area
PFOS	19	19	97	70.0-130.0	471810

**Surrogate Standards**

SS Compound	Spiked	Found	%Recovery	Limits	Pass/Fail
13C2_PFHxA	2.0	1.9	96	70 - 130	Pass
13C2_PFDA	2.0	2.0	99	70 - 130	Pass
d5-EtFOSAA	8.0	8.3	104	70 - 130	Pass

**Internal Standards**

IS Compound	Area	Ical Limits	CCV Limits	Pass/Fail
13C3_PFPtOPrA	223888	112299 - 336896	---	Pass
13C2_PFOA	440105	213002 - 639005	---	Pass
13C4_PFOS	568125	281769 - 845307	---	Pass
d3-MeFOSAA	346021	170979 - 512936	---	Pass

50-150% of Ical area

70-140% of the preceding CCV area



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1700 Elm Street, Suite 200

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### Method 537 (Modified) Calibration Verification Summary ICV

Lab Calibration ID	ICV-12332-189	Instrument ID	10LCMS02
Run File Name	B190528A_010	Column ID	H18-061776
Injected By	WM	Ical ID	190528A02
Analyzed	05/28/2019 09:42		

Compound	Known Conc.	Conc. Found	%Recovery	Recovery Limits	Area
PFOS	19	19	97	70.0-130.0	471810

**Surrogate Standards**

SS Compound	Spiked	Found	%Recovery	Limits	Pass/Fail
13C2_PFHxA	2.0	1.9	96	70 - 130	Pass
13C2_PFDA	2.0	2.0	99	70 - 130	Pass
d5-EtFOSAA	8.0	8.3	104	70 - 130	Pass

**Internal Standards**

IS Compound	Area	Ical Limits	CCV Limits	Pass/Fail
13C3_PFPtOPrA	223888	112299 - 336896	---	Pass
13C2_PFOA	440105	213002 - 639005	---	Pass
13C4_PFOS	568125	281769 - 845307	---	Pass
d3-MeFOSAA	346021	170979 - 512936	---	Pass

50-150% of Ical area

70-140% of the preceding CCV area



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**Method 537 (Modified) Calibration Verification Summary  
CCV**

Lab Calibration ID	CAL-12332-188-01	Instrument ID	10LCMS02
Run File Name	B190528D_002	Column ID	H18-061776
Injected By	WM	Ical ID	190528A02
Analyzed	05/29/2019 06:40	Level	Low

Compound	Known Conc.	Conc. Found	%Recovery	Recovery Limits	Area
PFOS	1.9	2.0	105	50.0-150.0	52291

**Surrogate Standards**

SS Compound	Spiked	Found	%Recovery	Limits	Pass/Fail
13C2_PFHxA	2.0	1.9	95	70 - 130	Pass
13C2_PFDA	2.0	2.0	100	70 - 130	Pass
d5-EtFOSAA	8.0	9.4	117	70 - 130	Pass

**Internal Standards**

IS Compound	Area	Ical Limits	CCV Limits	Pass/Fail
13C3_PFPtOPrA	206862	112299 - 336896	153560 - 307120	Pass
13C2_PFOA	433100	213002 - 639005	311637 - 623274	Pass
13C4_PFOS	581309	281769 - 845307	416385 - 832770	Pass
d3-MeFOSAA	351073	170979 - 512936	257471 - 514943	Pass

50-150% of Ical area

70-140% of the preceding CCV area



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**Method 537 (Modified) Calibration Verification Summary  
CCV**

Lab Calibration ID	CAL-12332-188-03	Instrument ID	10LCMS02
Run File Name	B190528D_017	Column ID	H18-061776
Injected By	WM	Ical ID	190528A02
Analyzed	05/29/2019 09:36	Level	Mid

Compound	Known Conc.	Conc. Found	%Recovery	Recovery Limits	Area
PFOS	9.6	9.9	103	70.0-130.0	245874

**Surrogate Standards**

SS Compound	Spiked	Found	%Recovery	Limits	Pass/Fail
13C2_PFHxA	2.0	2.0	98	70 - 130	Pass
13C2_PFDA	2.0	2.0	100	70 - 130	Pass
d5-EtFOSAA	8.0	8.5	107	70 - 130	Pass

**Internal Standards**

IS Compound	Area	Ical Limits	CCV Limits	Pass/Fail
13C3_PFPPrOPrA	205348	112299 - 336896	144803 - 289606	Pass
13C2_PFOA	424976	213002 - 639005	303170 - 606340	Pass
13C4_PFOS	556382	281769 - 845307	406916 - 813832	Pass
d3-MeFOSAA	355371	170979 - 512936	245751 - 491502	Pass

50-150% of Ical area

70-140% of the preceding CCV area



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Minneapolis, MN 55414

(612) 607-1700

### Method 537 (Modified) Calibration Verification Summary CCV

Lab Calibration ID	CAL-12332-188-05	Instrument ID	10LCMS02
Run File Name	B190528D_026	Column ID	H18-061776
Injected By	WM	Ical ID	190528A02
Analyzed	05/29/2019 11:22	Level	High

Compound	Known Conc.	Conc. Found	%Recovery	Recovery Limits	Area
PFOS	38	38	100	70.0-130.0	994172

**Surrogate Standards**

SS Compound	Spiked	Found	%Recovery	Limits	Pass/Fail
13C2_PFHxA	2.0	1.9	93	70 - 130	Pass
13C2_PFDA	2.0	2.1	105	70 - 130	Pass
d5-EtFOSAA	8.0	8.4	105	70 - 130	Pass

**Internal Standards**

IS Compound	Area	Ical Limits	CCV Limits	Pass/Fail
13C3_PFPtOPtA	209837	112299 - 336896	143743 - 287487	Pass
13C2_PFOA	441625	213002 - 639005	297483 - 594966	Pass
13C4_PFOS	582432	281769 - 845307	389468 - 778935	Pass
d3-MeFOSAA	345084	170979 - 512936	248760 - 497520	Pass

50-150% of Ical area

70-140% of the preceding CCV area



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(612) 607-1700

**Method 537 (Modified) Calibration Verification Summary  
CCV**

Lab Calibration ID	CAL-12332-188-01	Instrument ID	10LCMS02
Run File Name	B190528D_036	Column ID	H18-061776
Injected By	WM	Ical ID	190528A02
Analyzed	05/29/2019 13:20	Level	Low

Compound	Known Conc.	Conc. Found	%Recovery	Recovery Limits	Area
PFOS	1.9	2.0	104	50.0-150.0	49132

**Surrogate Standards**

SS Compound	Spiked	Found	%Recovery	Limits	Pass/Fail
13C2_PFHxA	2.0	1.9	96	70 - 130	Pass
13C2_PFDA	2.0	2.0	101	70 - 130	Pass
d5-EtFOSAA	8.0	8.7	108	70 - 130	Pass

**Internal Standards**

IS Compound	Area	Ical Limits	CCV Limits	Pass/Fail
13C3_PFPtOPtA	200502	112299 - 336896	146886 - 293771	Pass
13C2_PFOA	437671	213002 - 639005	309137 - 618274	Pass
13C4_PFOS	553169	281769 - 845307	407703 - 815405	Pass
d3-MeFOSAA	351558	170979 - 512936	241559 - 483118	Pass

50-150% of Ical area

70-140% of the preceding CCV area